

Strait of Georgia Juvenile Herring Survey, September 2011 and 2012

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STRAIT OF GEORGIA JUVENILE HERRING SURVEY,
SEPTEMBER 2011 AND 2012

by

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ABSTRACT

Thompson, M., Fort, C., and Schweigert, J. 2013. Strait of Georgia juvenile herring survey, September 2011 and 2012. Can. Manuscr. Rep. Fish. Aquat. Sci. 3016: vi + 63 p.

Fall juvenile herring surveys of the Strait of Georgia took place in 2011 and 2012. All forty-eight stations were sampled throughout the Strait of Georgia following the ten core transects that have been sampled since 1990. The survey area extends from Trincomali Channel in the south to Smelt Bay in the north. Both surveys were run through the month of September. Plankton tows were performed to determine food organism abundance in the study area. CTD casts were made *only* during the 2011 survey to determine temperature and salinity.

RESUME

Thompson, M., Fort, C., and Schweigert, J. 2013. Strait of Georgia juvenile herring survey, September 2011 and 2012. Rapp. manus. can. sci. halieut. aquat. 3016: vi + 63 p.

Des enquêtes automnales sur le hareng juvénile dans le détroit de Georgie ont eu lieu en 2011 et 2012. Les quarante-huit stations ont fait l'objet d'un échantillonnage dans l'ensemble du détroit de Georgie après l'échantillonnage de 10 transects principaux depuis 1990. La zone d'enquête s'étend du chenai Trincomali au sud jusqu'à Smelt Bay au nord. Les deux enquêtes ont eu lieu tout au long du mois de septembre. On a effectué des traits de plancton pour évaluer l'abondance des organismes alimentaires dans la zone à l'étude. On a procédé à des profils CTP *uniquement* au cours de l'enquête de 2011 pour déterminer la température et la salinité.

INTRODUCTION

Pacific herring (*Clupea pallasii*) are an important commercial and a vital forage species for many marine mammals, birds and other fish in British Columbia's coastal waters. Herring spawn principally on marine vegetation in the subtidal and upper intertidal zone between February and June, with peak spawning between March and April (Humphreys and Hourston 1978). Larvae hatch in two to three weeks, and disperse with surface currents, metamorphosing into juvenile or young-of-the-year herring at a length of ~25mm (Hourston and Haegele 1980). Herring are considered juveniles or immature until they are about three years of age and have joined the sexually mature spawning population (Hay and McCarter 1999). During daylight hours, juvenile herring congregate in schools, occasionally forming mixed aggregates with other pelagic species, close to shore near the bottom (Haegele 1997). At dusk, these fish migrate into surface waters to feed on plankton. During this time they are vulnerable to purse seine gear.

Purse seine surveys to determine the distribution and abundance of juvenile herring in the Strait of Georgia have been conducted annually since 1990, except for 1995 (Figure 1). The main objective of the survey was to estimate the density and relative abundance of the juvenile herring population as a potential indicator of recruitment before they have joined the spawning stock (Schweigert et. al. 2009). In addition to recruitment prediction, the surveys have contributed to a better understanding of the distribution, abundance, and ecological role of herring in the Strait of Georgia.

METHODS

The annual survey of juvenile herring in the Strait of Georgia (Figure 2) followed the ten core sampling transects (1 – 6, 8 – 11); which are made up of 48 sampling stations and have been sampled consistently since 1990 (except 1995). These ten core transects have been used in juvenile herring recruitment prediction (Hay et. al. 2003). Originally, the sampling sites were chosen based on known historical herring spawning sites, and represent both nearshore and open water habitats (Haegele et. al. 2005). In 2011, sampling was conducted from September 11th to 30th (Table 1). In 2012, sampling was conducted from September 11th to 26th (Table 2). All forty-eight core stations were sampled in both years.

Fish Sampling

The 12 m, aluminum-hulled Fisheries Research Vessel *Walker Rock* was used for all fishing events. A 183 m long and 27 m deep purse seine net of knotless web, resulting in an area fished of ~2665 m², was used for all fishing events. The body of the net had 46 m of 22.2 mm mesh at the tow end followed by 91 m of 19.0 mm mesh, and the bunt end was 46 m of 9.5 mm mesh. The net fished to a depth of 10 m, and was able to retain fish greater than 20 mm in length. All sets were made after dusk when herring are feeding

near the surface. All sets were made "blind" at the pre-determined sampling stations. Five sets were completed per night, depending on location, and length of travel between transects and the marine weather forecast. For most sets, it was possible to land the entire catch for biological sampling. On occasion, it was not practical to land a large set in its entirety, so sub-sampling was necessary. When sub-sampling was required, a 40 kg tote was filled with randomly selected fish and retained for biological sampling. Several dipnet samples were taken from various parts of the net (catch) to make up the random sub-sample. The remainder of the set was released over the corkline, its size estimated as the number of totes released. The number of herring caught in each set was determined by dividing the total catch weight by the mean weight of sub-sampled herring. The number of other species caught was determined in the same manner (Tables 3 and 4). All fish retained for sampling were bagged and preserved in a 3.7 % seawater formalin solution, with the exception of large predator species (e.g. adult salmon and flatfish). These fish were individually measured in the field. All retained fish were later sampled in the laboratory at the Pacific Biological Station. From each set, 100 or more herring and all other fish species caught were identified, weighed and measured. If the set contained less than 100 herring, then all herring were weighed and measured. Consistent with standard practices, herring were measured to standard length, salmon to fork length and groundfish to total length; all to the nearest millimeter. All other fish species were measured to standard length.

Plankton Sampling

Twenty stepped oblique plankton tows were performed during both surveys (Figures 3 and 4). The tows always were completed after dusk and immediately before the fishing events. A nearshore and offshore tow location was sampled for all transects. Dual 19 cm diameter bongo nets with 350 μ m mesh were used for sampling, resulting in 'left' and 'right' bongo plankton samples (only left samples were processed). The bongos were lowered to 20 m (10 m in shallow areas) and raised by an electric winch at a rate of 1 m every 15 sec (or 1 m every 30 sec for shallow areas). A General Oceanics® 2030R model flowmeter was attached to the left bongo to determine the volume of seawater filtered. Volume filtered was calculated using the following equation (McCarter and Hay 2002):

$$V = (A \cdot F \cdot K) / 999,999$$

where:

V = volume of water filtered through the plankton net (m^3)

A = area of net opening ($0.02835 m^2$)

F = number of revolutions recorded by the flow meter (m)

K = standard speed rotor constant for 7cm rotor (26,873)

Upon retrieval, the bongo nets were washed with a high pressure deck hose, and the samples preserved in 3.7 % seawater formalin.

In the laboratory, a volumetric splitter was used to reduce the sample size to a point where organisms could be conveniently counted and identified in a counting tray using a stereo microscope under 30X magnification. Sample splitting continued until a target size of roughly 300 organisms was reached (Thompson et al. 2003).

When possible, plankters were identified to the lowest taxonomic level. Copepods were identified to species. Densities for all plankters were determined and expressed as plankters/ m³.

CTD Sampling

In 2011, to characterize oceanographic conditions in the surveyed area, a total of 20 CTD (conductivity – temperature – density) casts were made using a Seabird SBE 19*plus* (Figure 3). A CTD cast was performed at each plankton tow location following the nearshore/offshore sampling location protocol. The CTD unit was lowered over the side of the vessel, at a rate of 1m/sec, to within two meters of the bottom. Data was downloaded to a laptop computer for further processing at the conclusion of the survey.

RESULTS

Herring 2011

Forty-eight stations were sampled from transects 1 – 6, 8 – 11. A total of 2724 herring were weighed and measured resulting in a length frequency distribution that was distinctly unimodal for age-0+ herring (Figure 4). Three length designations for the juvenile herring age-classes were produced:

0+ = herring less than or equal to 97 mm standard length

1+ = herring between 98 mm and 147 mm standard length

2+ and older = herring greater than or equal to 148 mm standard length

Age-0+ herring occurred in 89.6 % of the stations (Table 5). Forty-three of the forty-eight stations contained age-0+ herring. The mean length and weight for age-0+ herring was 78 mm and 6.60 g respectively. A total of 18749 age-0+ were caught for a total weight of 109.5 kg (Table 6).

Age-1+ herring occurred in 54.2 % of the stations (Table 5). Twenty-six of the forty-eight stations sampled contained age-1+ herring. The mean length and weight for age-1+ herring was 125 mm and 27.20 g, respectively. A total of 690 age-1+ herring were caught for a total weight of 21.0 kg (Table 6).

Age-2+ herring occurred in 25.0 % of the stations (Table 5). Twelve of the forty-eight stations sampled contained age-2+ herring. The mean length and weight for age-2+ herring was 160 mm and 57.42 g, respectively. A total of 532 age-2+ herring were caught for a total weight of 30.7 kg (Table 6).

Length frequency histograms by transect location for all sampled herring are shown in Figure 6. Only Yellow Point (transect 2) and Trincomali Channel (transect 6) were dominated by an age-0+ age-class. The majority of transects had a mixture of all three age classes. As seen in previous surveys, Trincomali Channel (Transect 6) and Yellow Point (Transect 2) produced age-0+ herring smaller than the survey average. This is more than likely due to the variation in spawning times of herring above and below Dodds Narrows. A length-weight relationship for all sampled herring from the survey showed a positive correlation coefficient (r^2) of 0.9867 (Figure 7).

Herring 2012

Forty-eight stations were sampled from transects 1 – 6, 8 – 11. A total of 4560 herring were weighed and measured resulting in a length frequency distribution that was distinctly unimodal for age-0+ herring (Figure 5). Three length designations for the juvenile herring age-classes were produced:

0+ = herring less than or equal to 109 mm standard length

1+ = herring between 110 mm and 153 mm standard length

2+ and older = herring greater than or equal to 154 mm standard length

Age-0+ herring occurred in 95.8 % of the stations (Table 5). Forty-six of the forty-eight stations contained age-0+ herring. The mean length and weight for age-0+ herring was 82 mm and 7.66 g respectively. A total of 122907 age-0+ herring were caught for a total weight of 971.39 kg (Table 7). This is the third largest catch total of age-0+ herring since the start of the survey in 1990.

Age-1+ herring occurred in 45.8 % of the stations (Table 5). Twenty-two of the forty-eight stations sampled contained age-1+ herring. The mean length and weight for age-1+ herring was 131 mm and 32.46 g, respectively. A total of 6445 age-1+ herring were caught for a total weight of 247.57 kg (Table 7).

Age-2+ herring occurred in 14.6 % of the stations (Table 5). Seven of the forty-eight stations sampled contained age-2+ herring. The mean length and weight for age-2+ herring was 162 mm and 57.23 g, respectively. A total of 168 age-2+ herring were caught for a total weight of 9.72 kg (Table 7).

Length frequency histograms by transect location for all sampled herring are shown in Figure 7. Most transects were dominated by a single age-0+ age-class except Clarke Rock (transect 1) and Atrevida Reef (transect 9) which included a mixture of all three herring age-classes. As seen in previous surveys, Trincomali Channel (transect 6) and Yellow Point (transect 2) produced age-0+ herring smaller than the survey average. This is more than likely due to the variation in spawning times of herring above and below Dodds Narrows. A length-weight relationship for all sampled herring from the survey showed a positive correlation coefficient (r^2) of 0.9761 (Figure 8).

Plankton 2011

There were 24 categories of organisms identified in 20 plankton samples (Tables 8 and 9). An average of 12.854 m³ of water was filtered per plankton tow. Calanoid copepod *Paracalanus parvus* was the only category to occur in all samples. Calanoid copepod *Paracalanus parvus*, ctenophores and medusae (*Aequorea victoria*) occurred in >95% of the samples. More than 60% of all plankton biomass captured were calanoid copepods *Paracalanus parvus* and *Metridia pacifica*, cyclopoid copepod *Corycaeus anglicus*, and ctenophores.

Plankton 2012

There were 25 categories of organisms identified in 20 plankton samples (Tables 11 and 12). An average of 8.792 m³ of water was filtered per plankton tow. Calanoid copepod *Paracalanus parvus* and larvaceans (*Oikopleura sp.* and *Fritillaria sp.*) were the only category to occur in all samples. Larvaceans (*Oikopleura sp.* and *Fritillaria sp.*), calanoid copepod *Paracalanus parvus*, cyclopoid copepod *Corycaeus anglicus*, ctenophores and siphonophores occurred in >95% of the samples. More than 75% of all plankton biomass captured were larvaceans (*Oikopleura sp.* and *Fritillaria sp.*), calanoid copepod *Paracalanus parvus* and barnacle larvae.

CTD

Two CTD casts were performed at each transect at a nearshore and offshore sampling location for a total of 20 casts. The CTD casts provided depth (m), temperature (°C) and salinity (S/m) (Figure 7). Unfortunately, data was lost due to a logging error for Bowser (transect 3), Henry Bay (transect 4), Smelt Bay (transect 8) and Atrevida Reef (transect 9).

CONCLUSION

2011

Forty-eight stations were sampled resulting in 22 different fish species recorded from purse seine sets. A total of 2724 herring were measured and weighed creating a unimodal histogram clearly representing age-0+ juvenile herring. Twenty plankton tows were performed resulting in calanoid copepod *Paracalanus parvus* being the predominant organisms in numbers and biomass.

2012

Forty-eight stations were sampled resulting in 22 different fish species recorded from purse seine sets. A total of 4560 herring were measured and weighed creating a unimodal histogram clearly representing age-0+ juvenile herring. Twenty plankton tows were performed resulting in larvaceans (*Oikopleura sp.* and *Fritillaria sp.*) and calanoid copepod *Paracalanus parvus* being the predominant organisms in numbers and biomass.

ACKNOWLEDGMENTS

Both the 2011 and 2012 Strait of Georgia juvenile herring survey was funded by the Department of Fisheries and Oceans. This survey could not have been possible without the hard work and good cheer of skipper Doug Henderson. Plankton samples were processed by Zotec services.

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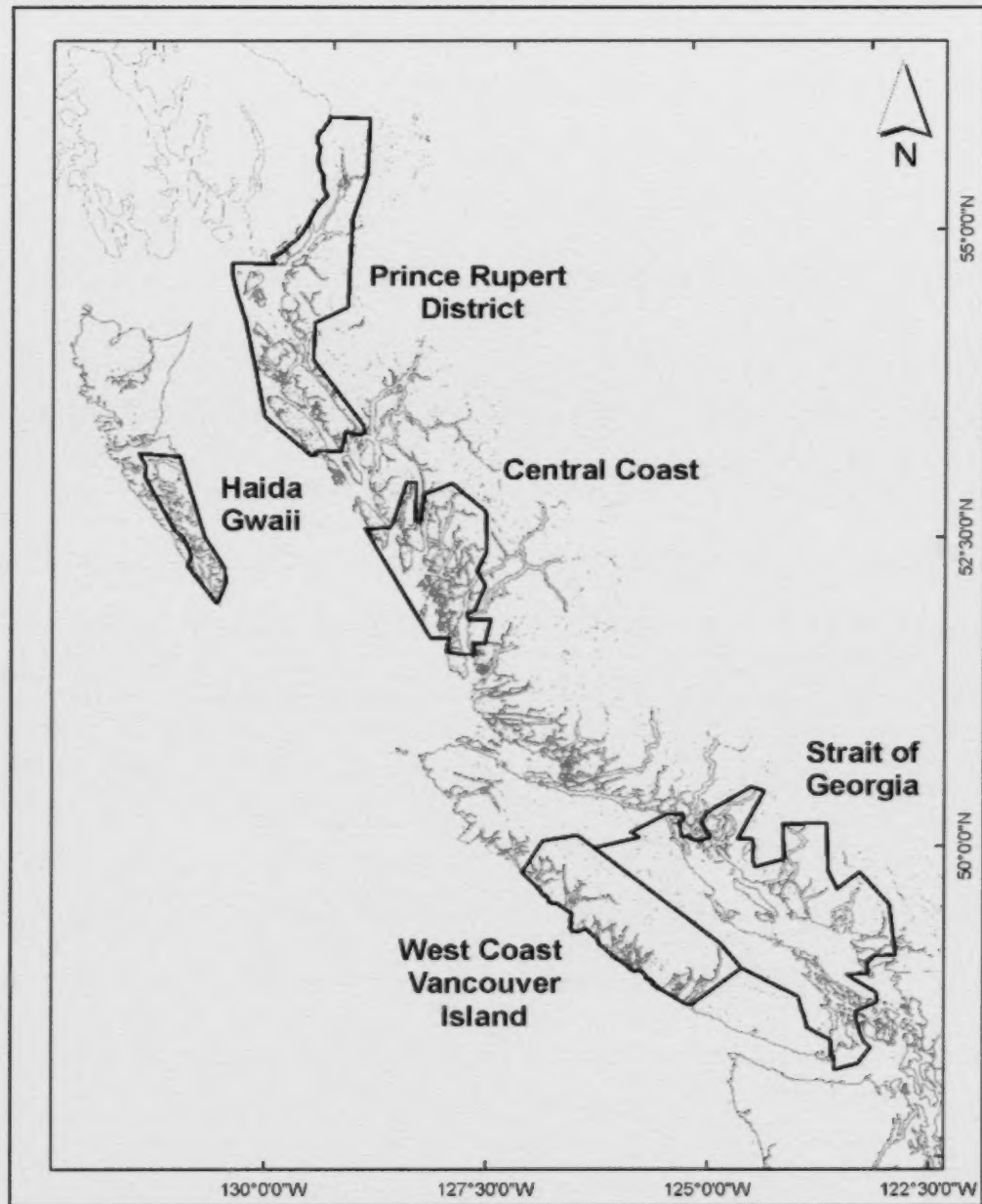


Figure 1. The five major British Columbia herring stock assessment areas.

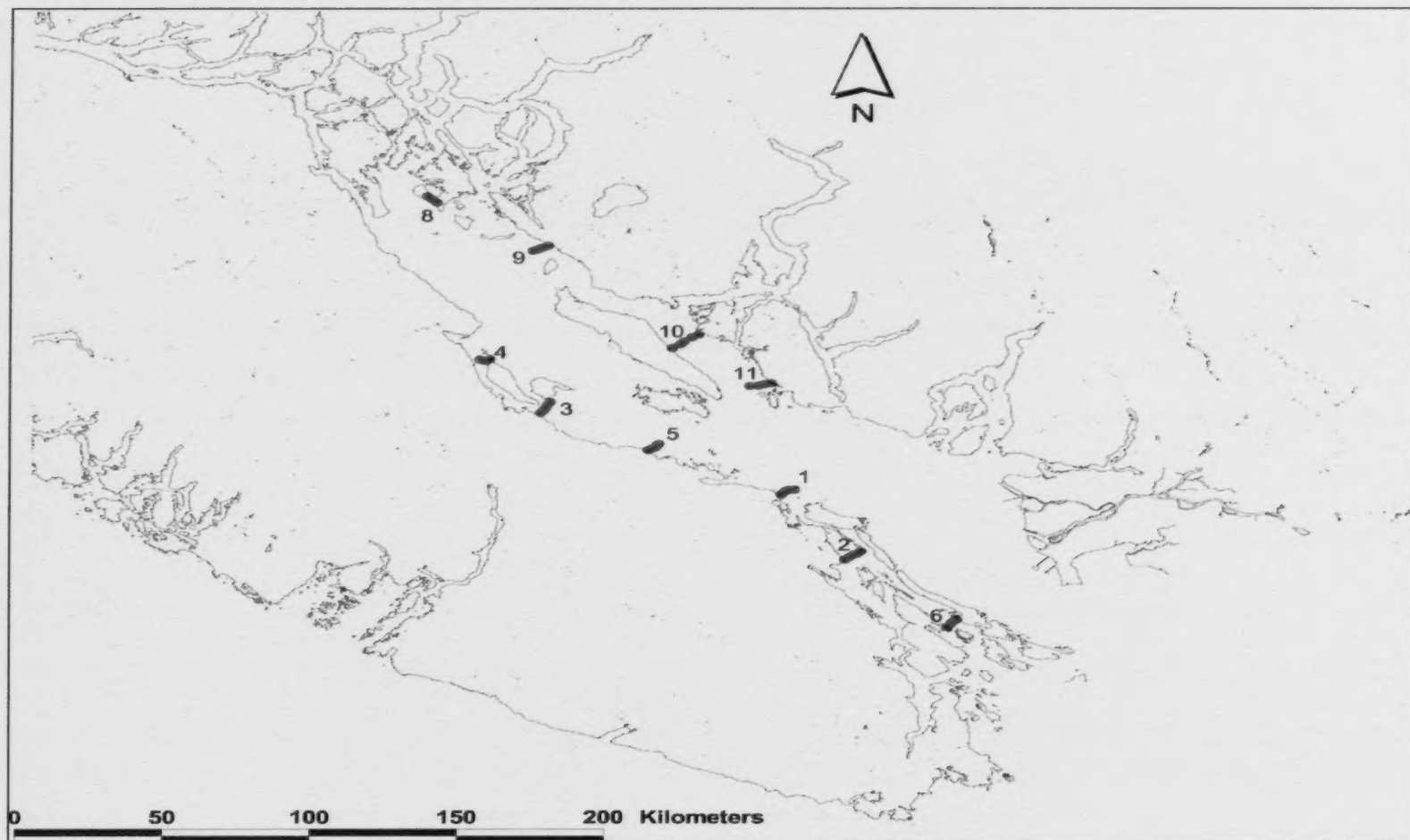


Figure 2. Purse seine set locations for the 2011 and 2012 Strait of Georgia juvenile herring survey.

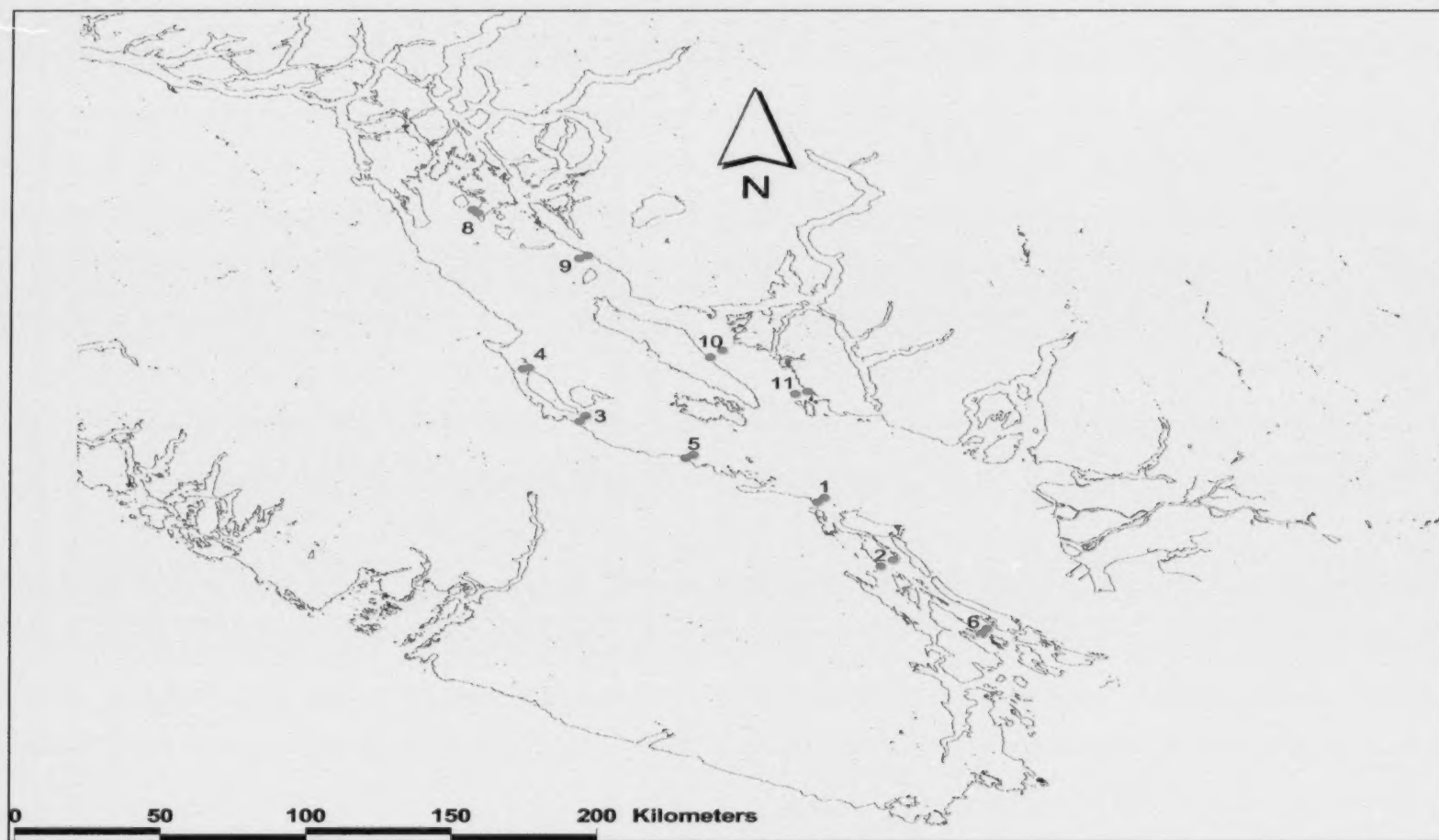


Figure 3. Plankton and CTD stations for 2011 and plankton stations for the 2012 Strait of Georgia juvenile herring survey.

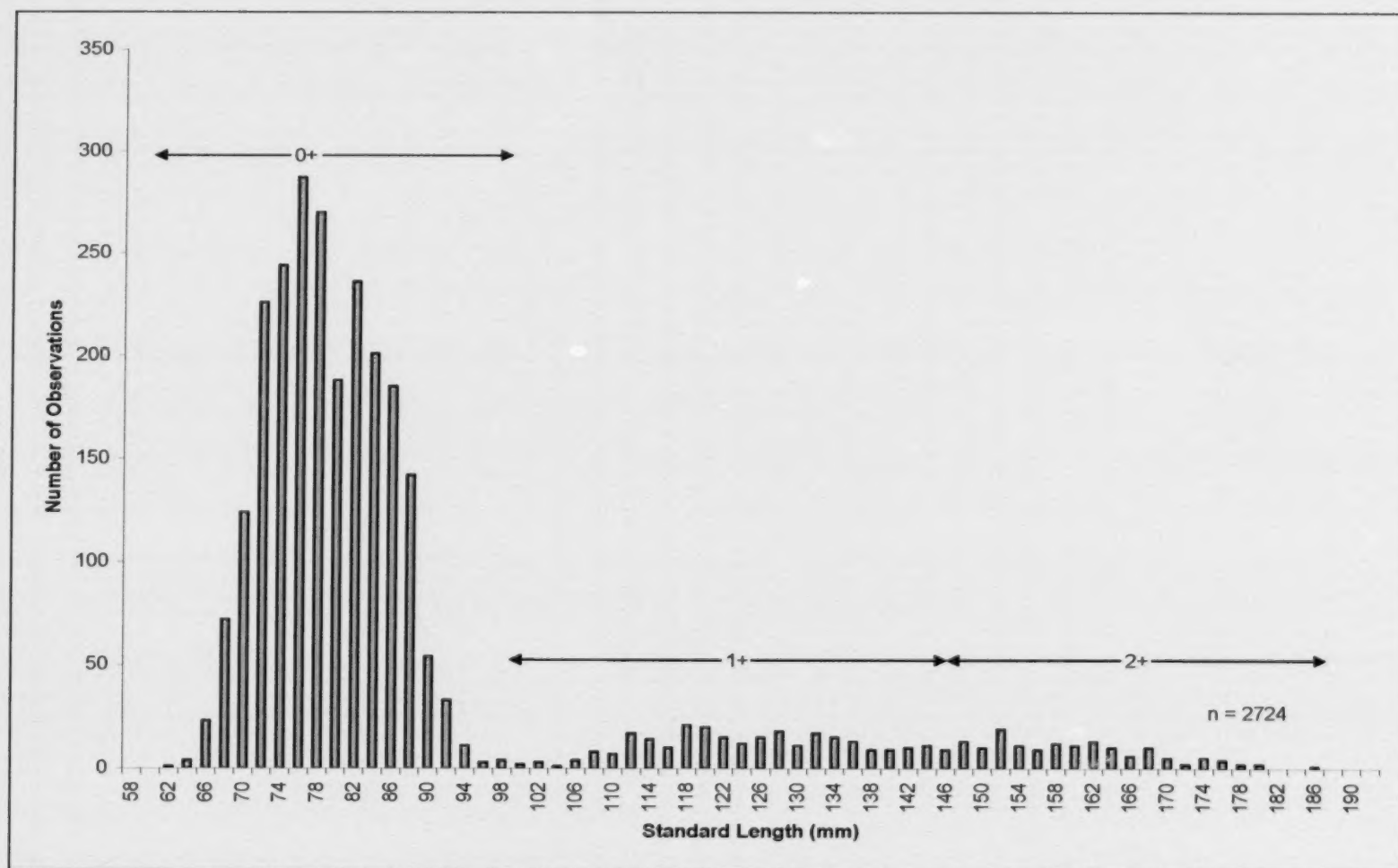


Figure 4. Length-frequency distribution for all herring sampled during the 2011 Strait of Georgia juvenile herring survey.

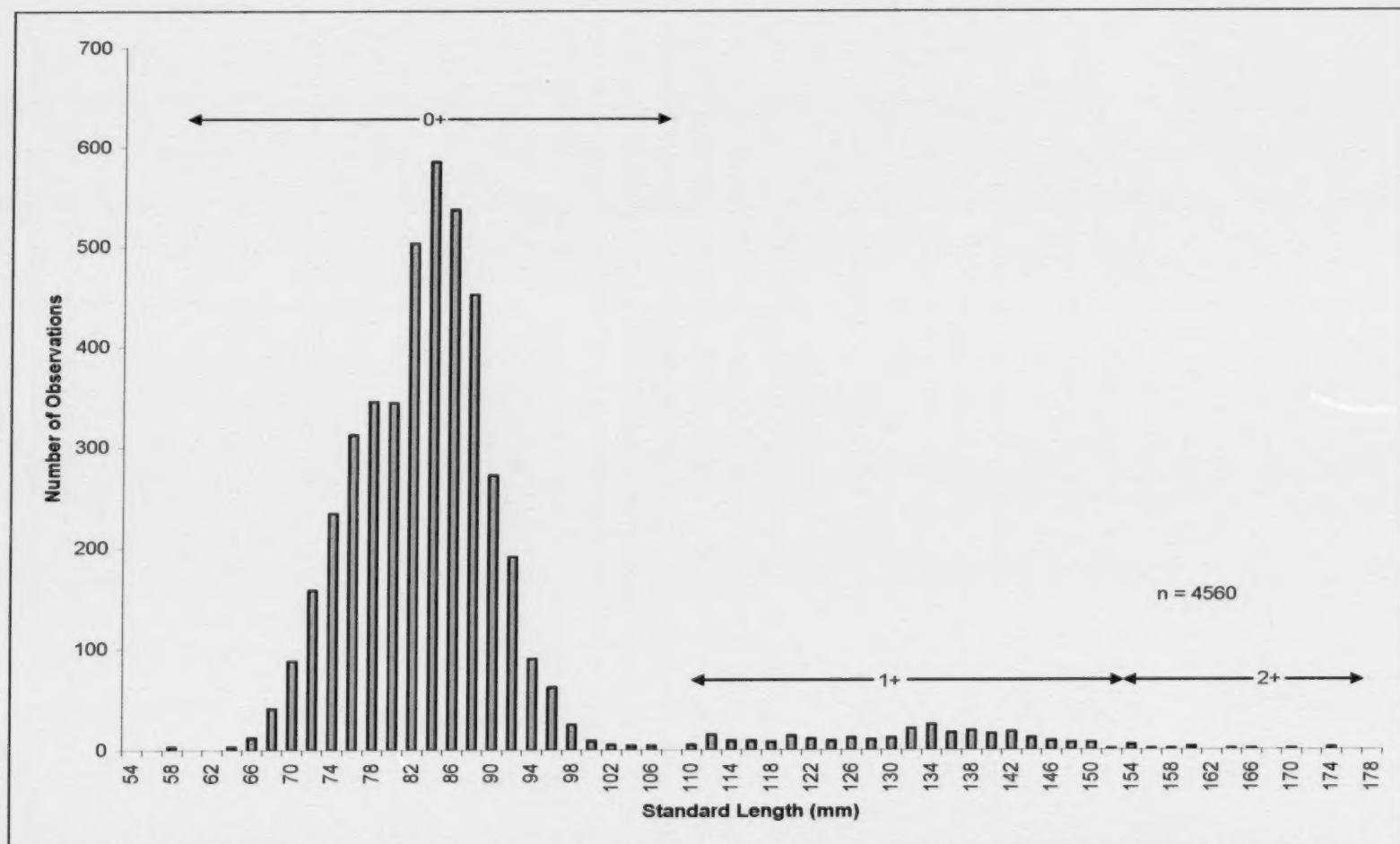


Figure 5. Length-frequency distribution for all herring sampled during the 2012 Strait of Georgia juvenile herring survey.

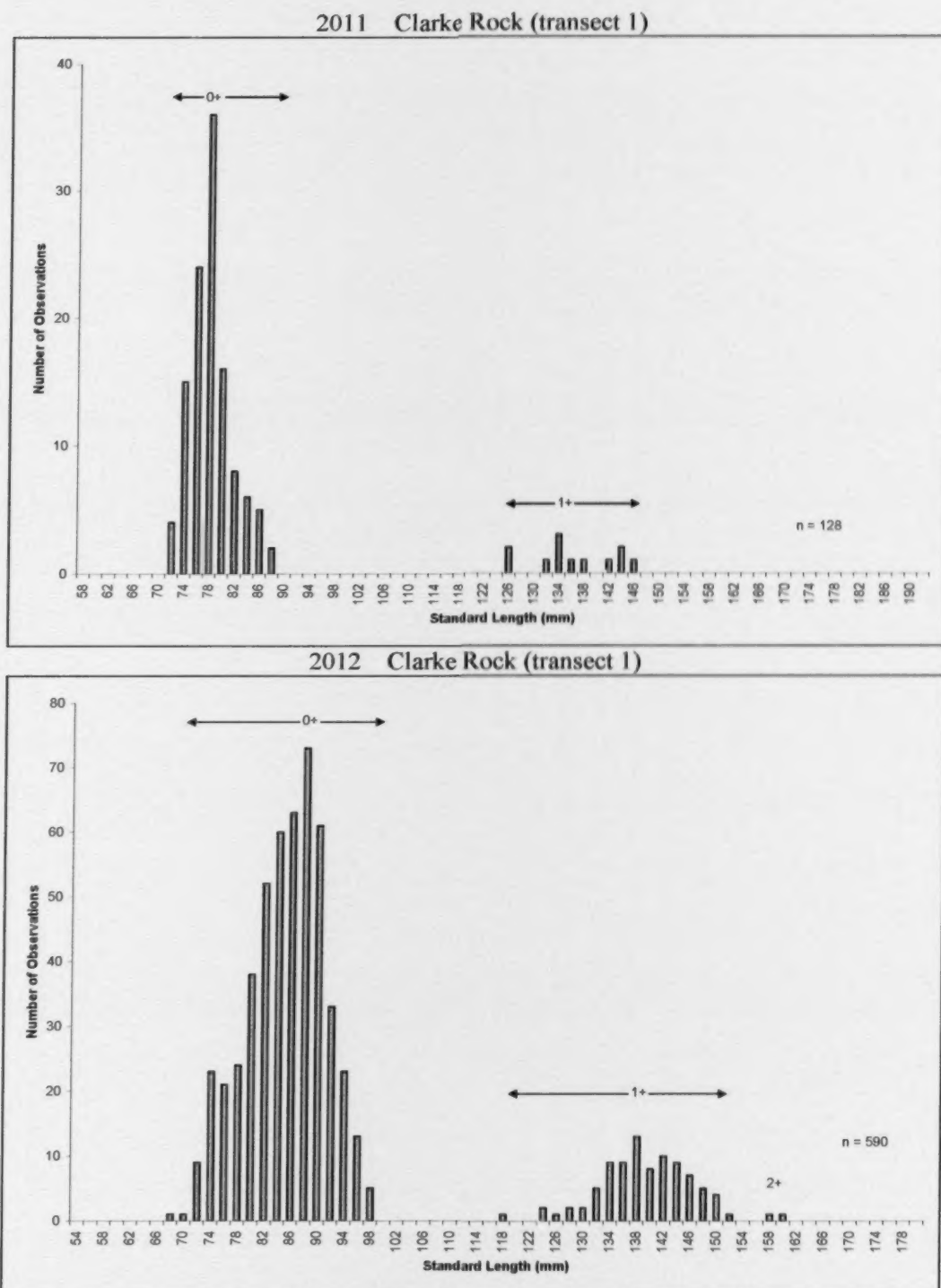
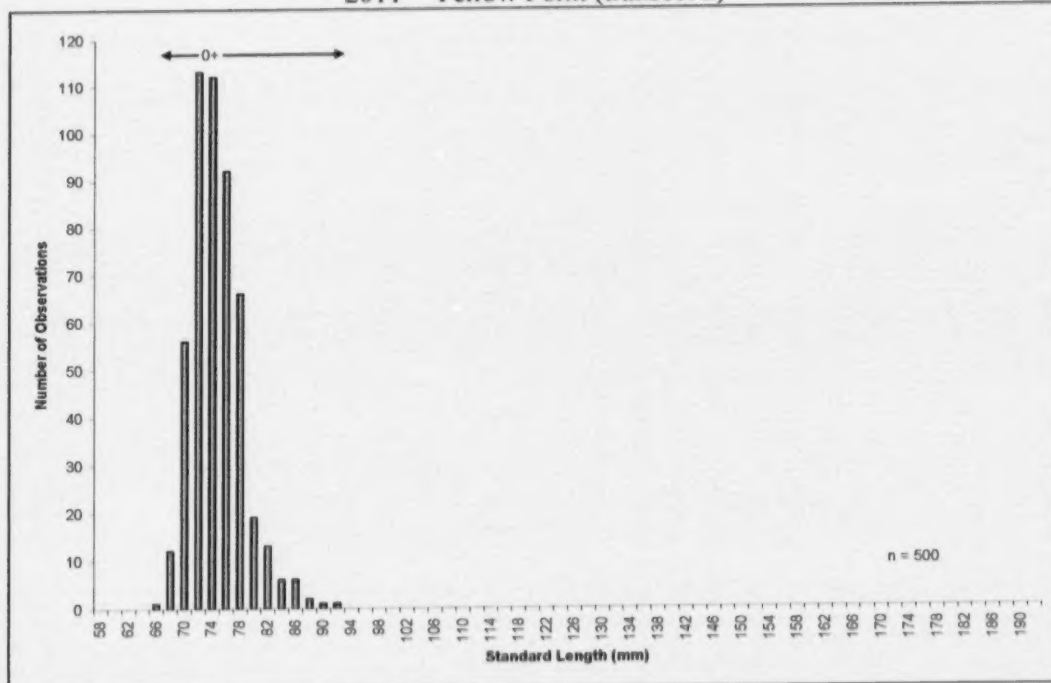


Figure 6. Length-frequency histograms of juvenile herring by transect location for the 2011 and 2012 Strait of Georgia juvenile herring survey.

2011 Yellow Point (transect 2)



2012 Yellow Point (transect 2)

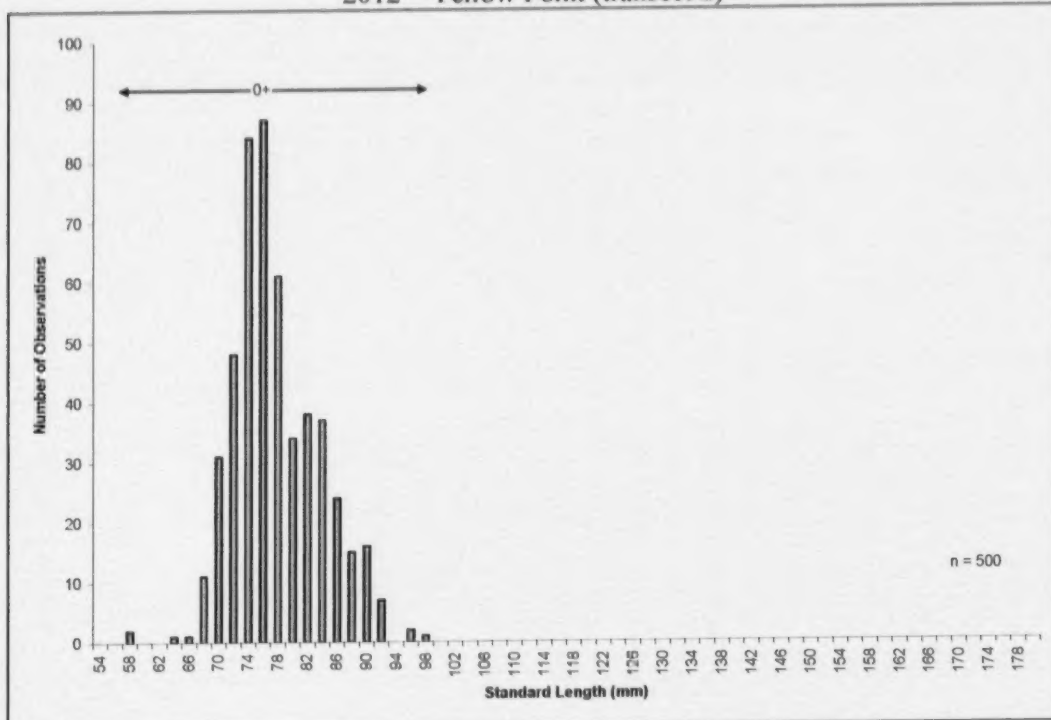
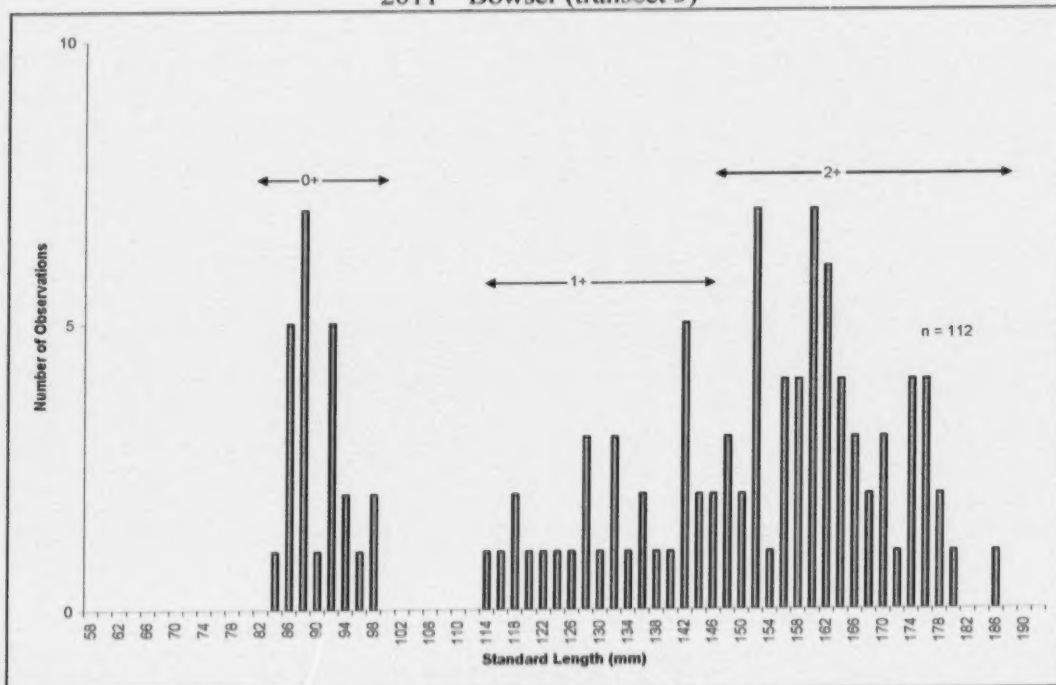


Figure 6 continued...

2011 Bowser (transect 3)



2012 Bowser (transect 3)

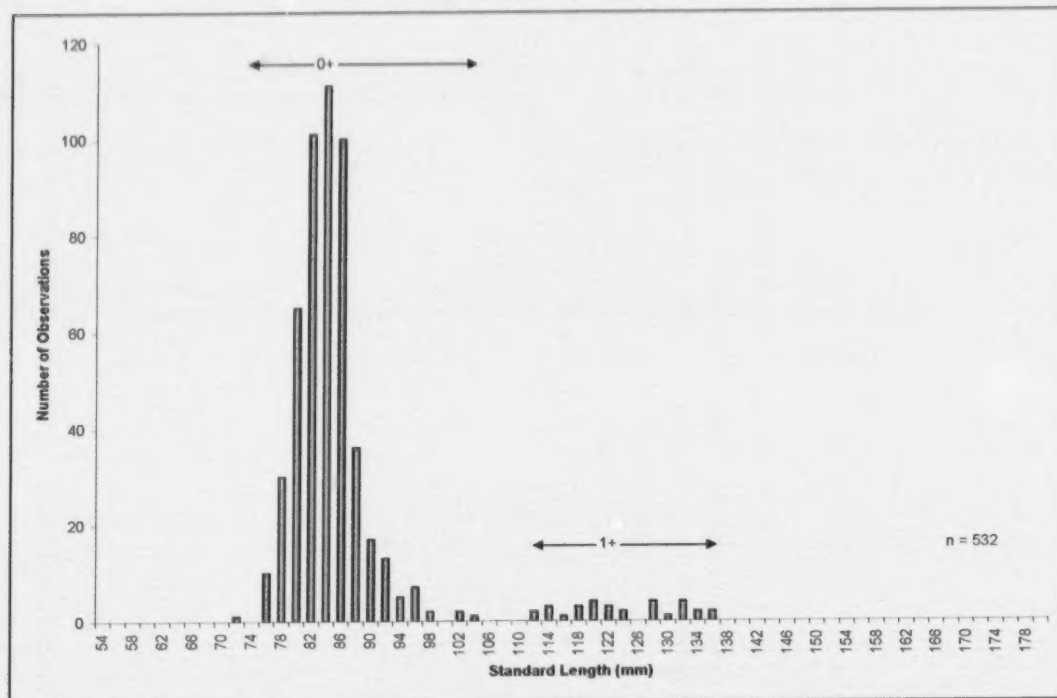
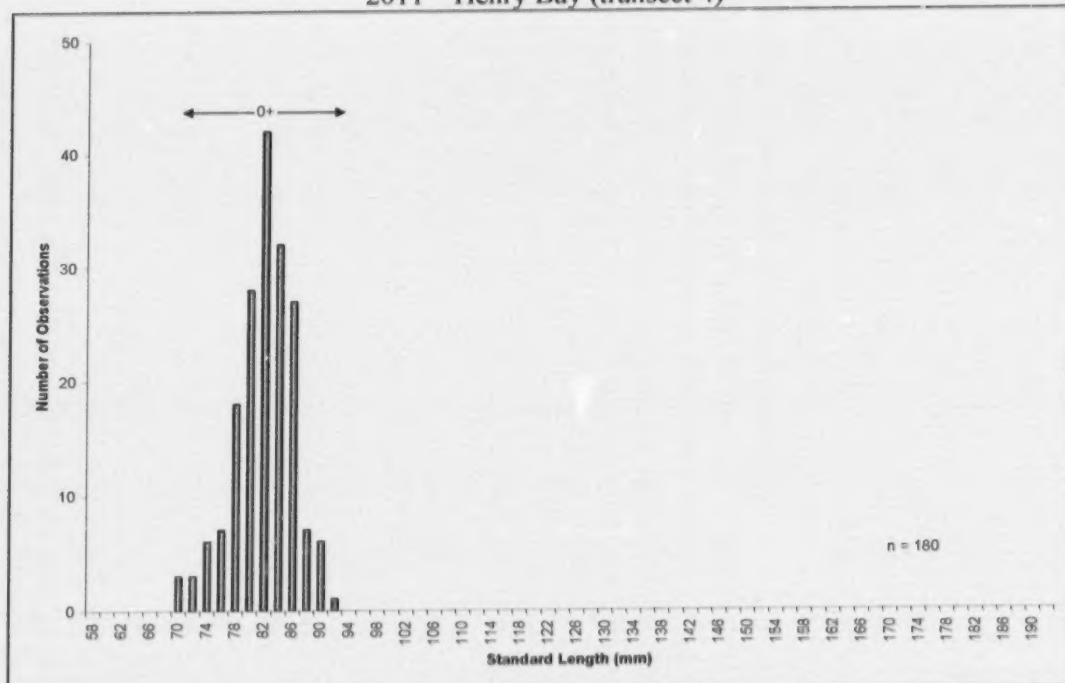


Figure 6 continued...

2011 Henry Bay (transect 4)



2012 Henry Bay (transect 4)

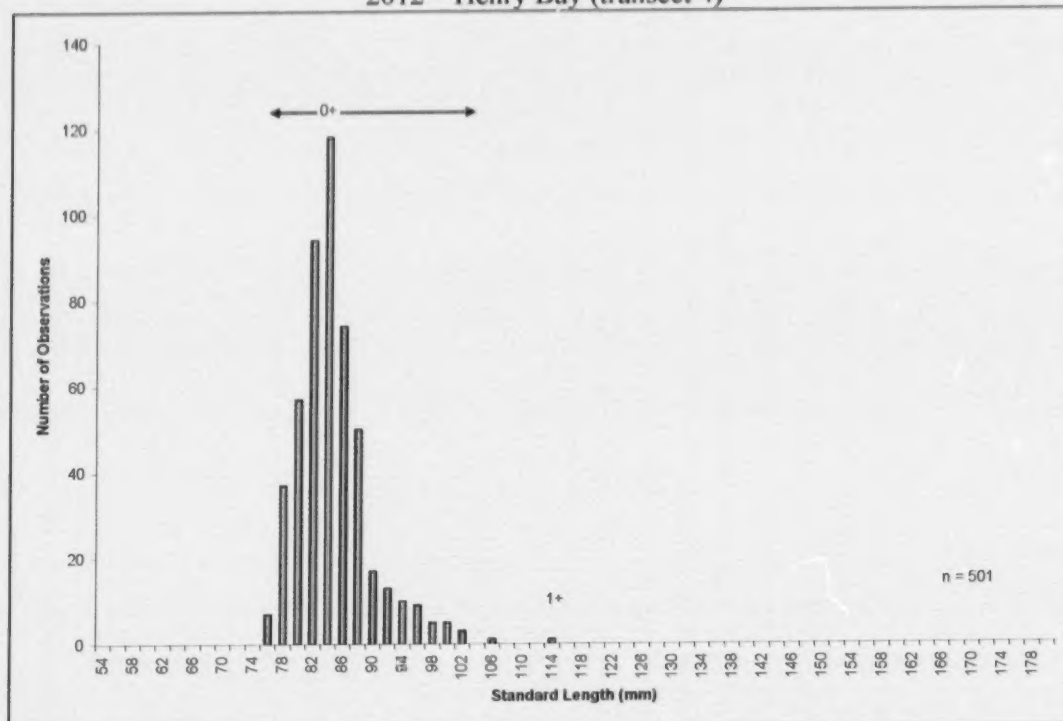
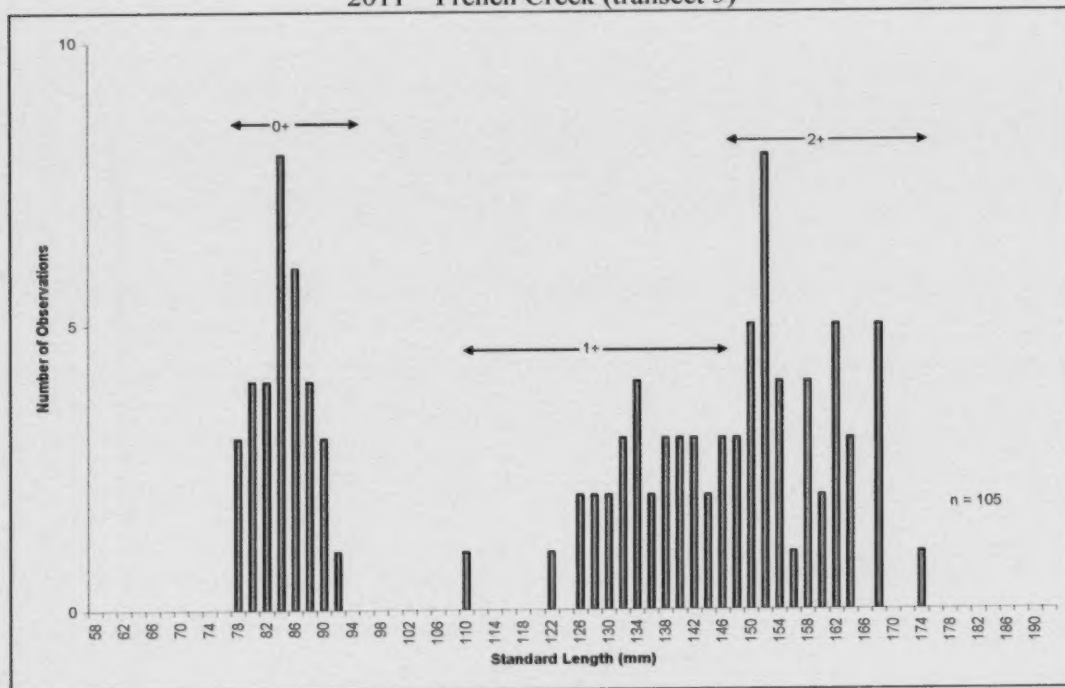


Figure 6 continued...

2011 French Creek (transect 5)



2012 French Creek (transect 5)

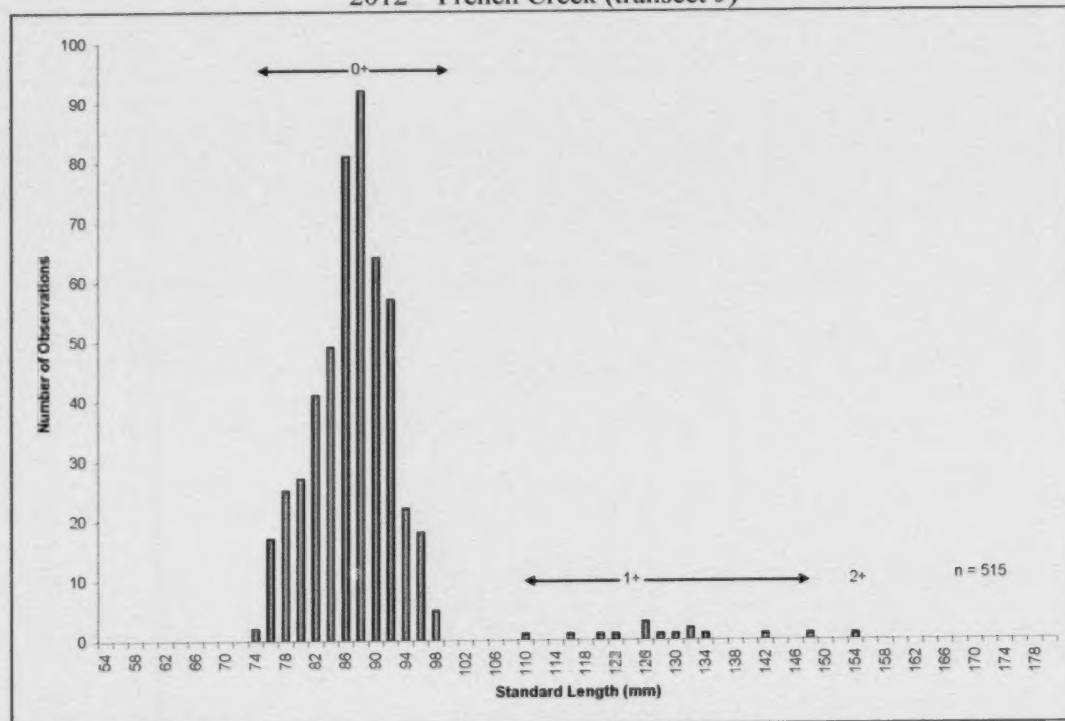
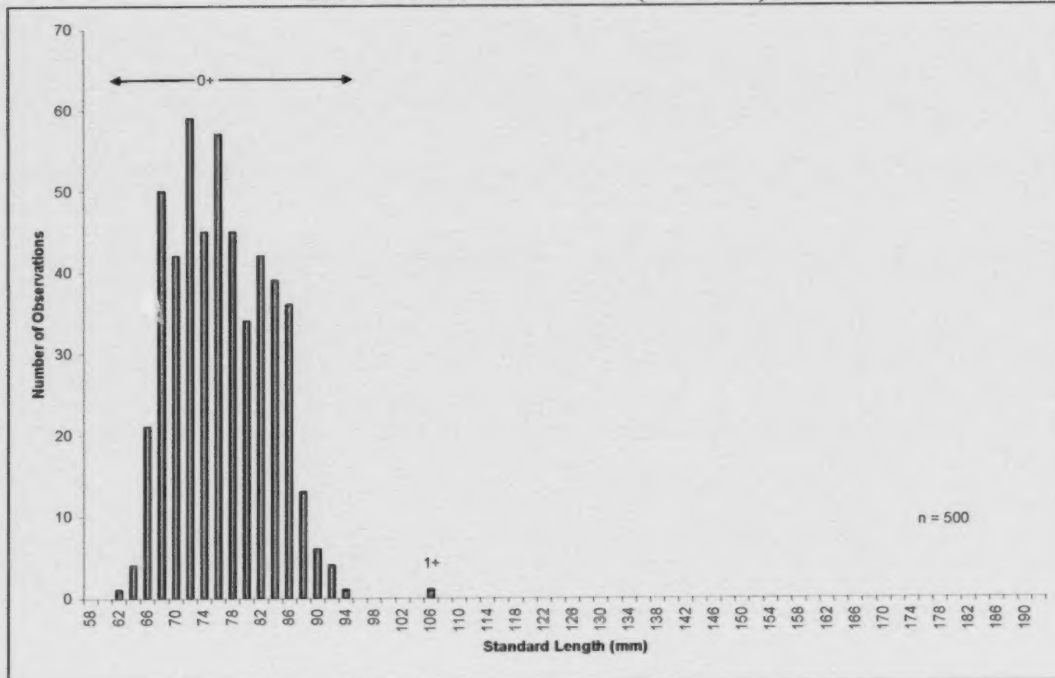


Figure 6 continued...

2011 Trincomali Channel (transect 6)



2012 Trincomali Channel (transect 6)

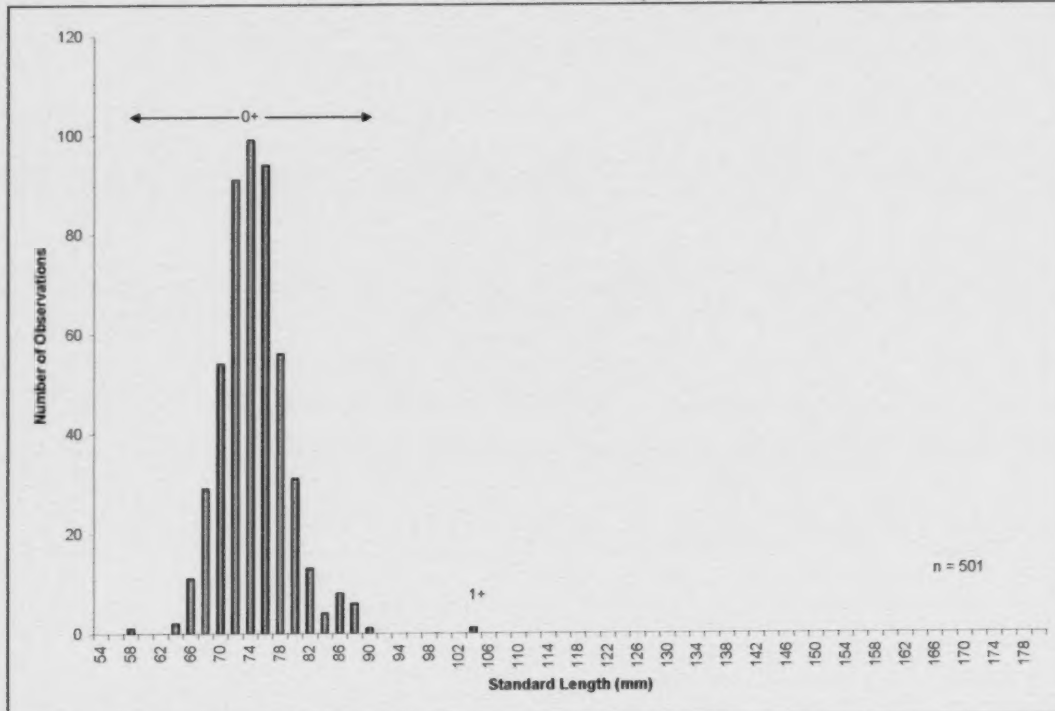
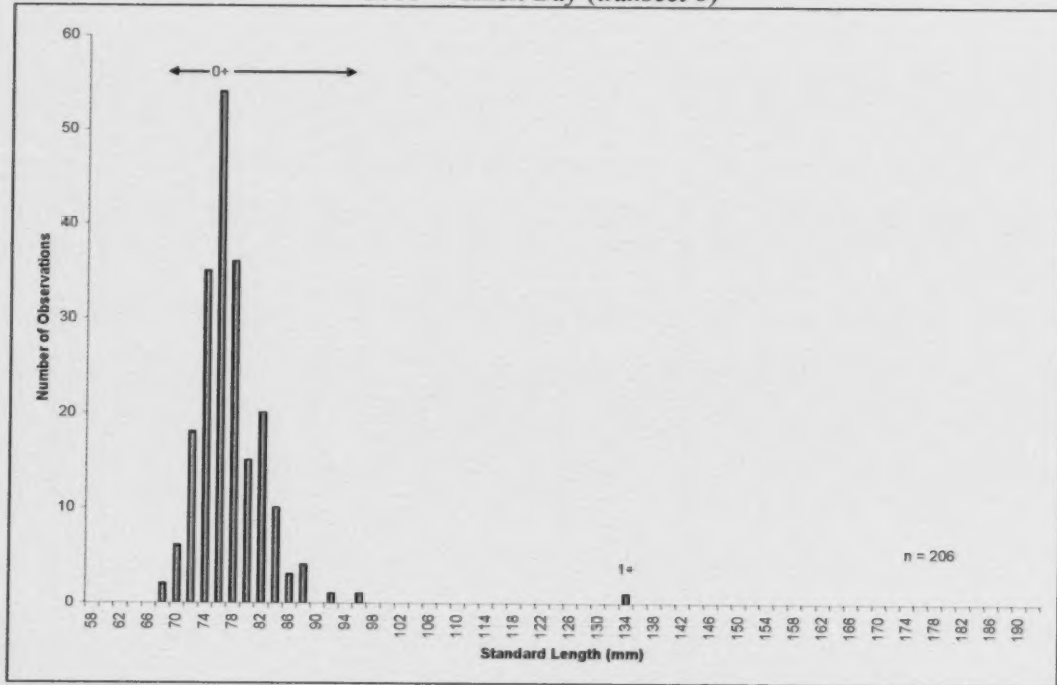


Figure 6 continued...

2011 Smelt Bay (transect 8)



2012 Smelt Bay (transect 8)

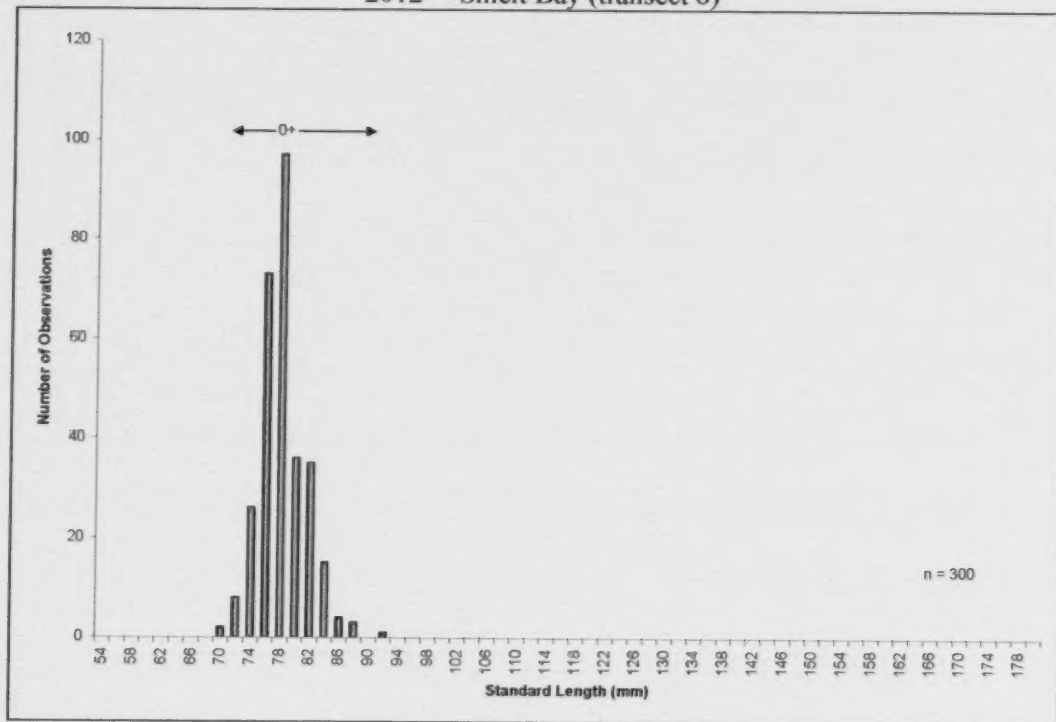
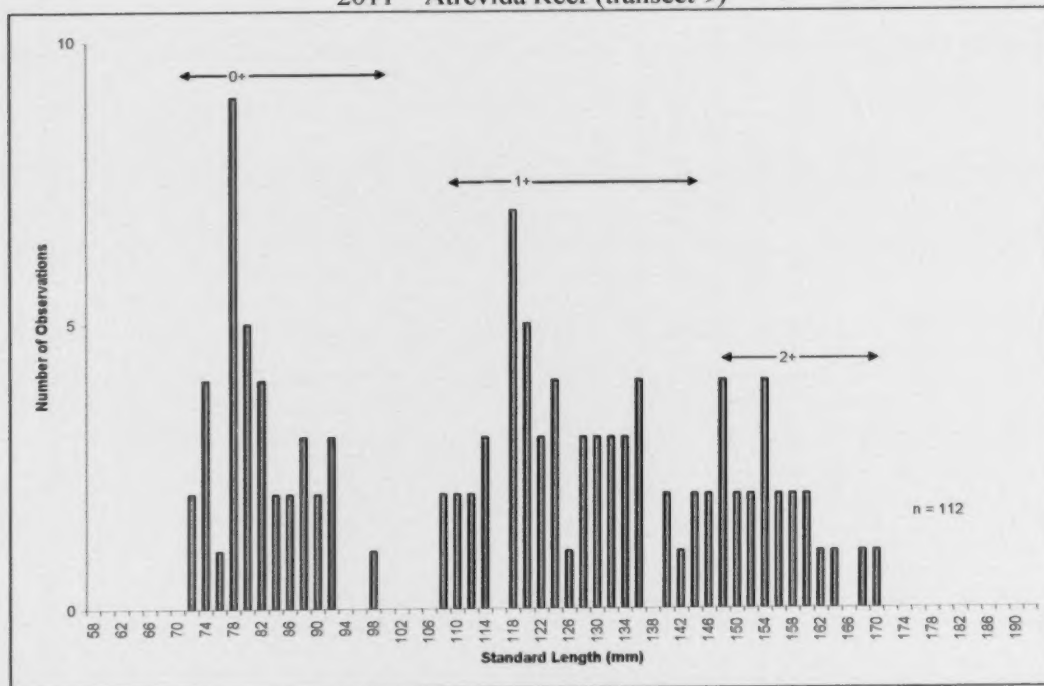


Figure 6 continued...

2011 Atrevida Reef (transect 9)



2012 Atrevida Reef (transect 9)

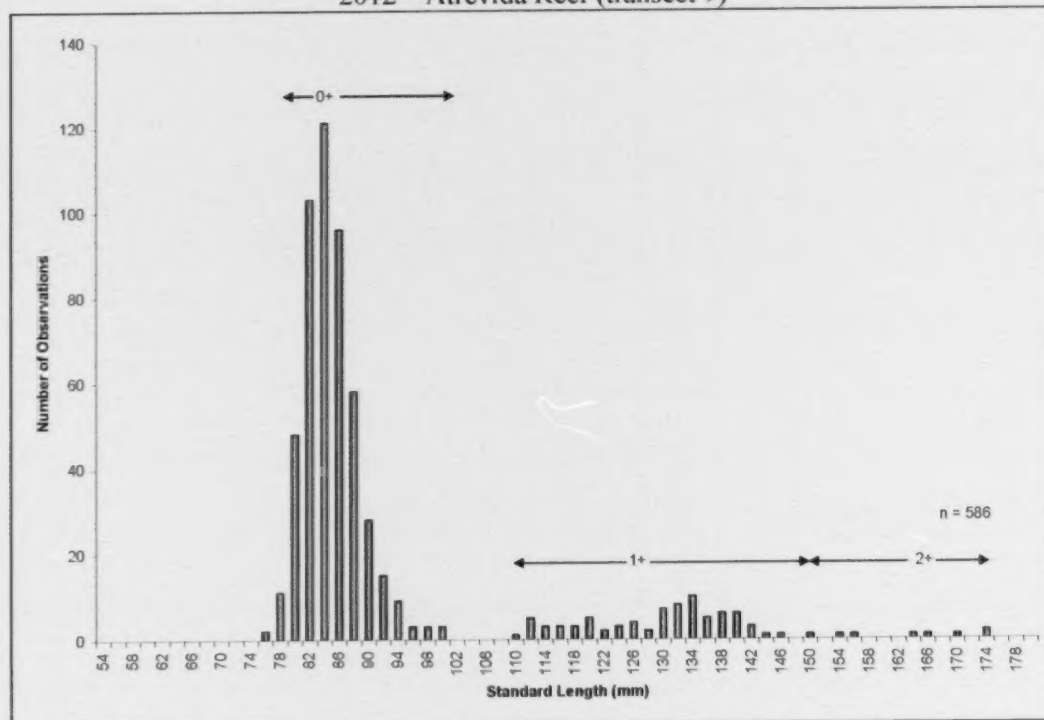
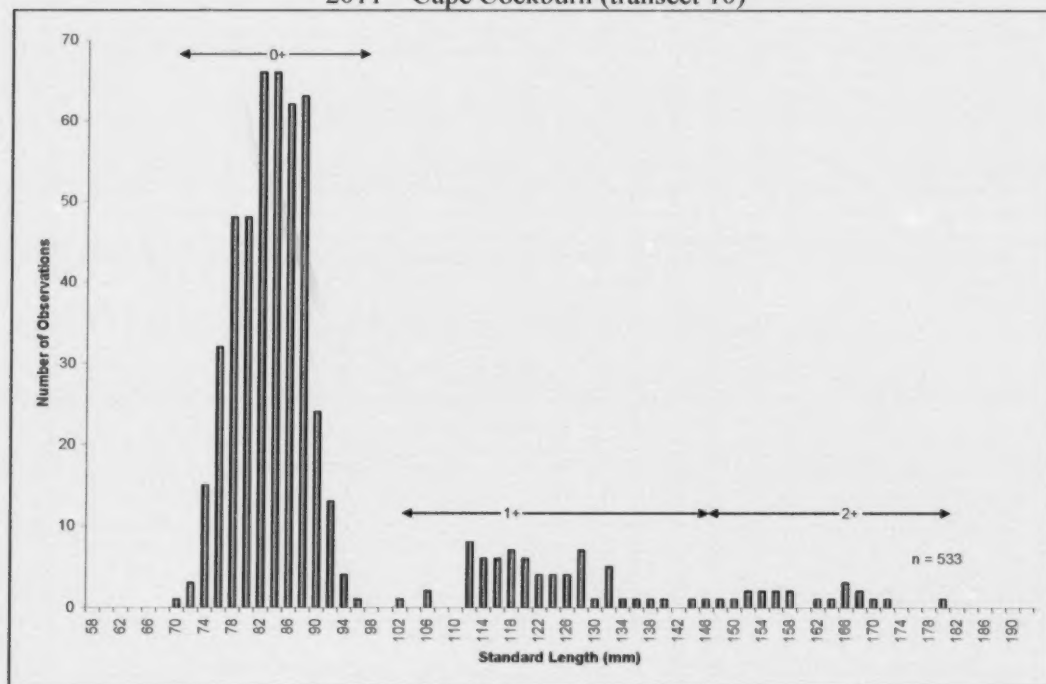


Figure 6 continued...

2011 Cape Cockburn (transect 10)



2012 Cape Cockburn (transect 10)

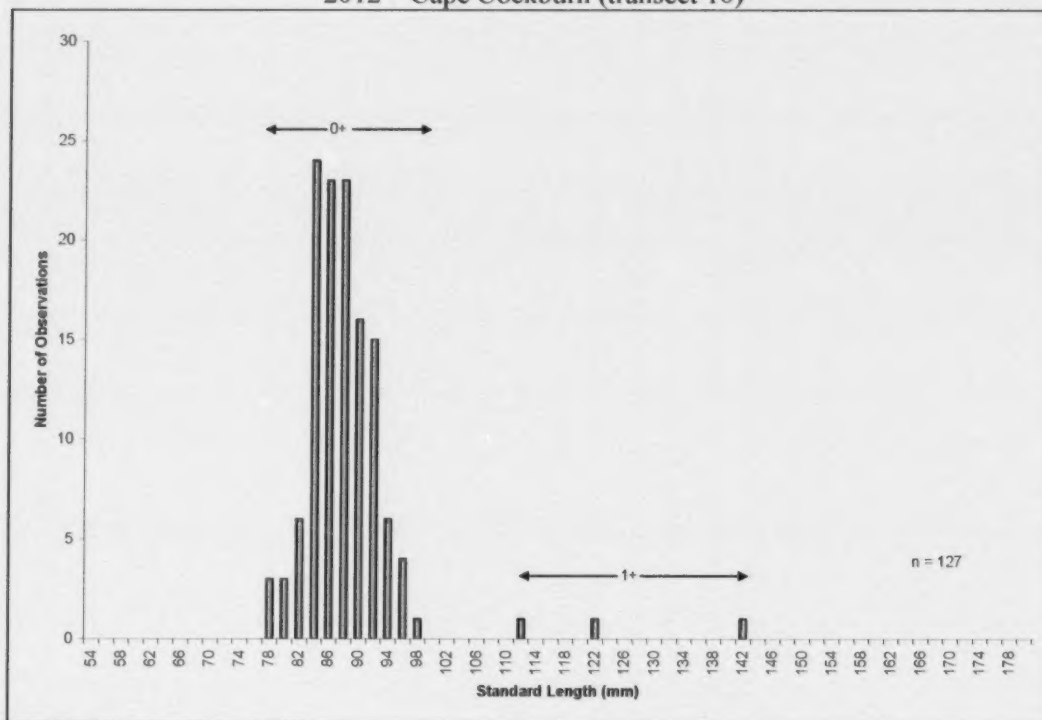
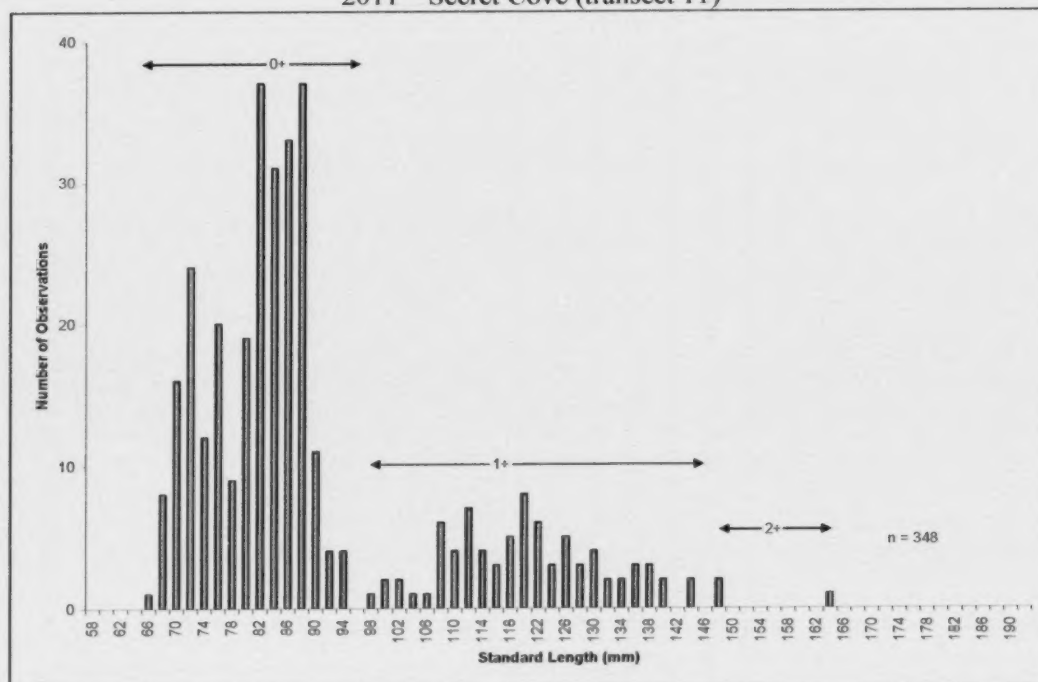


Figure 6 continued...

2011 Secret Cove (transect 11)



2012 Secret Cove (transect 11)

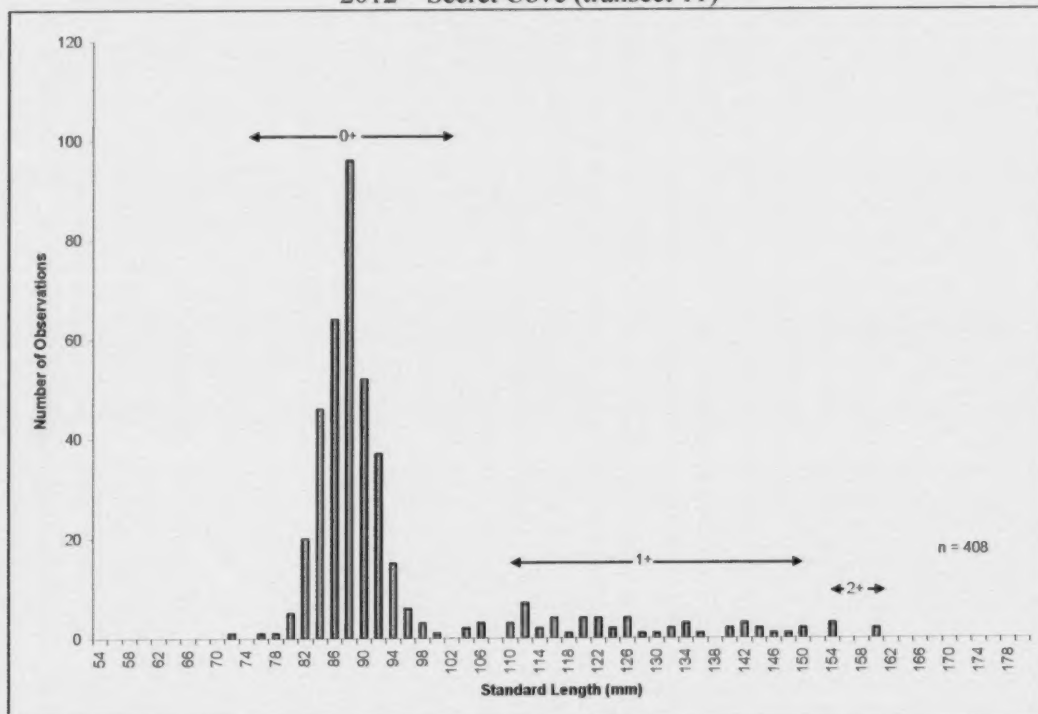


Figure 6 continued...

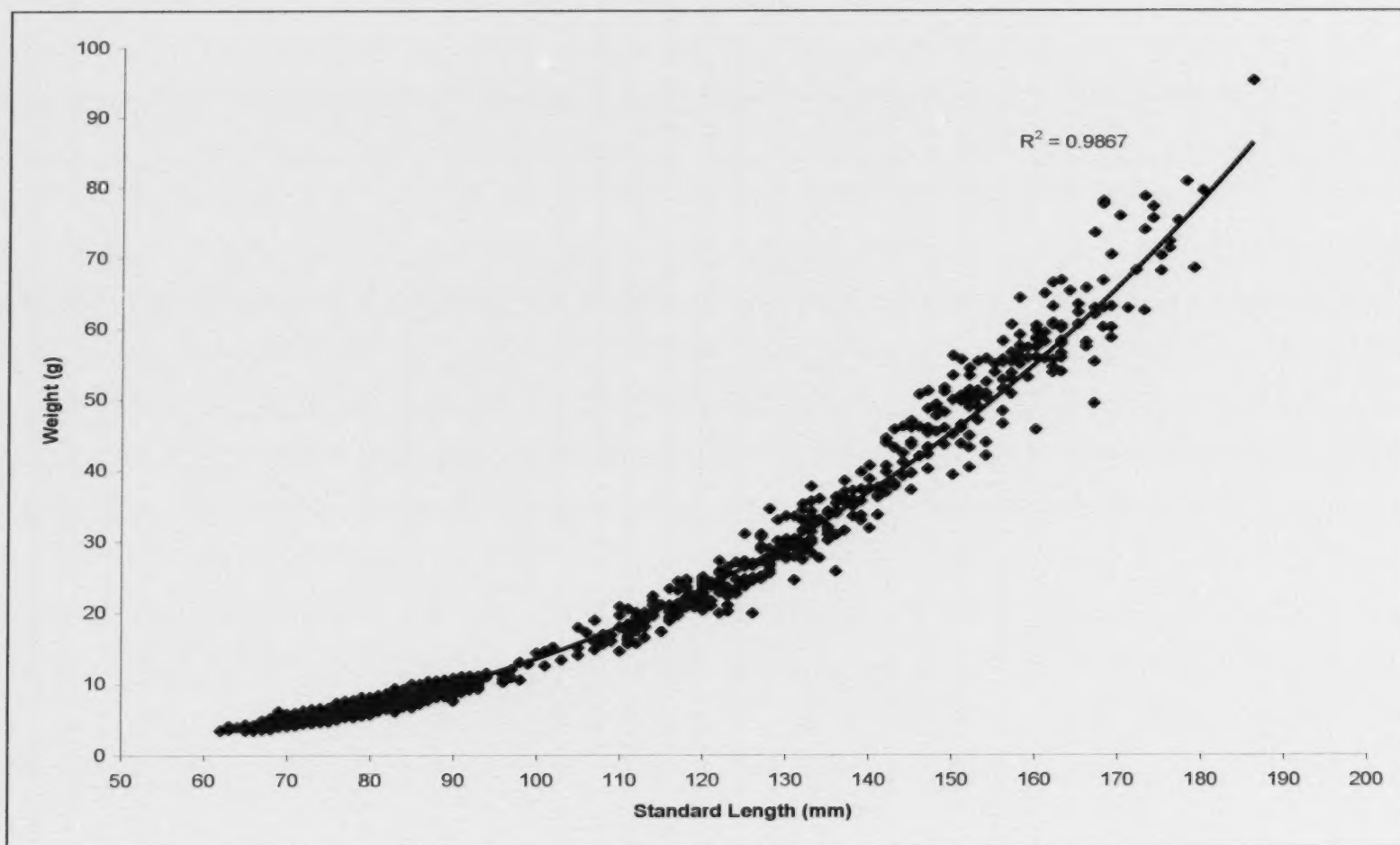


Figure 7. Length-weight relationship for all herring sampled during the 2011 Strait of Georgia juvenile herring survey.

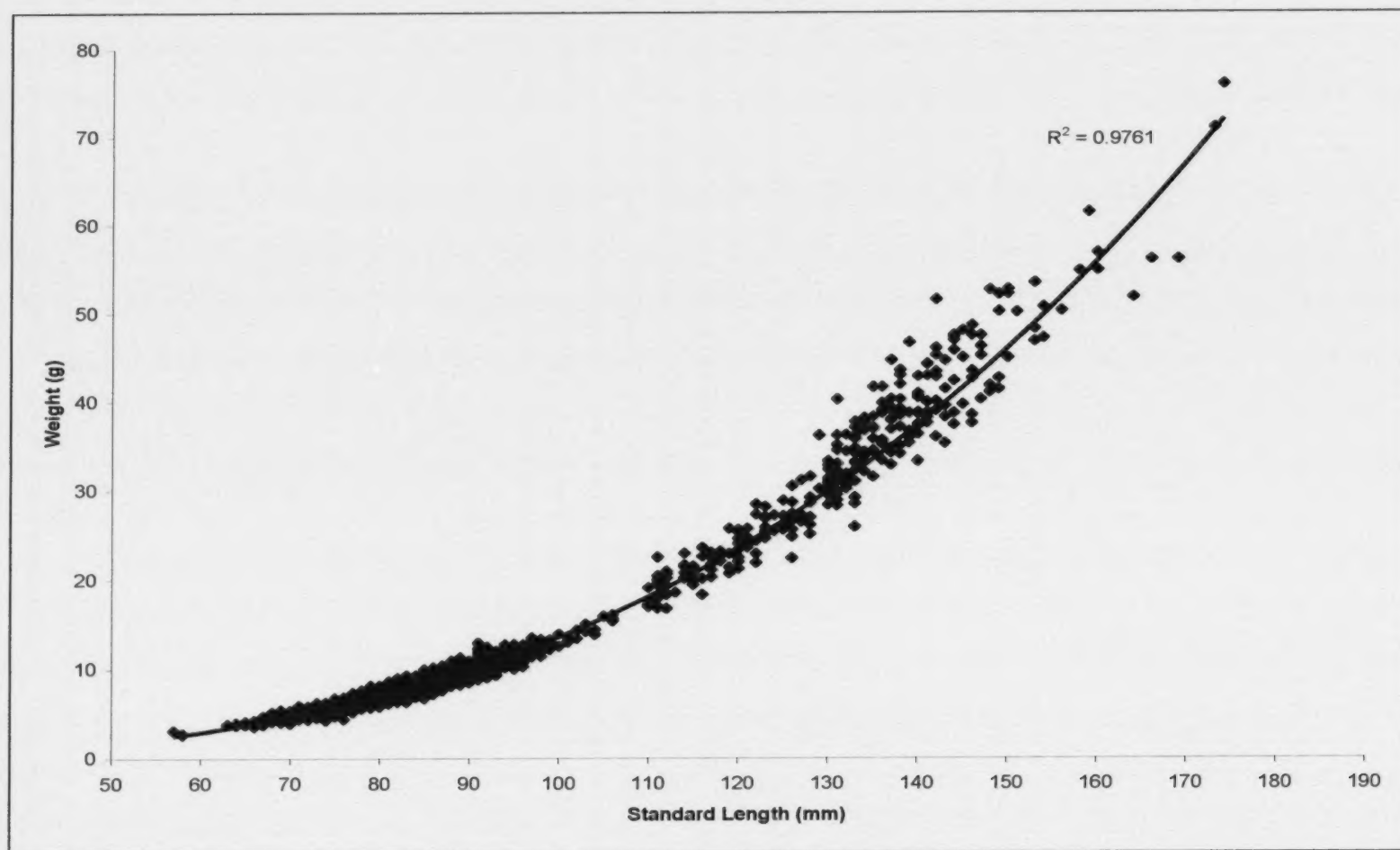


Figure 8. Length-weight relationship for all herring sampled during the 2012 Strait of Georgia juvenile herring survey.

Clarke Rock (Transect 1)

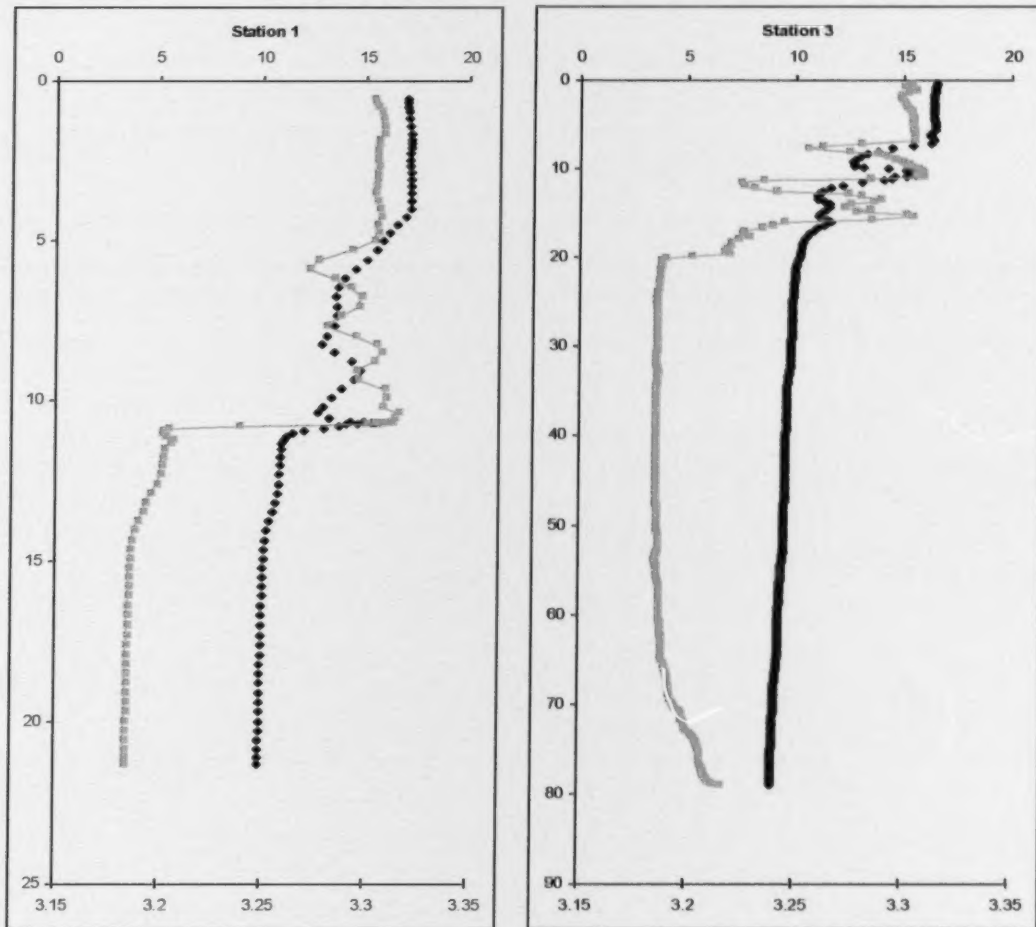


Figure 9. Temperature (squares) and salinity (diamonds) profiles from CTD casts during the 2011 Strait of Georgia juvenile herring survey.

Yellow Point (Transect 2)

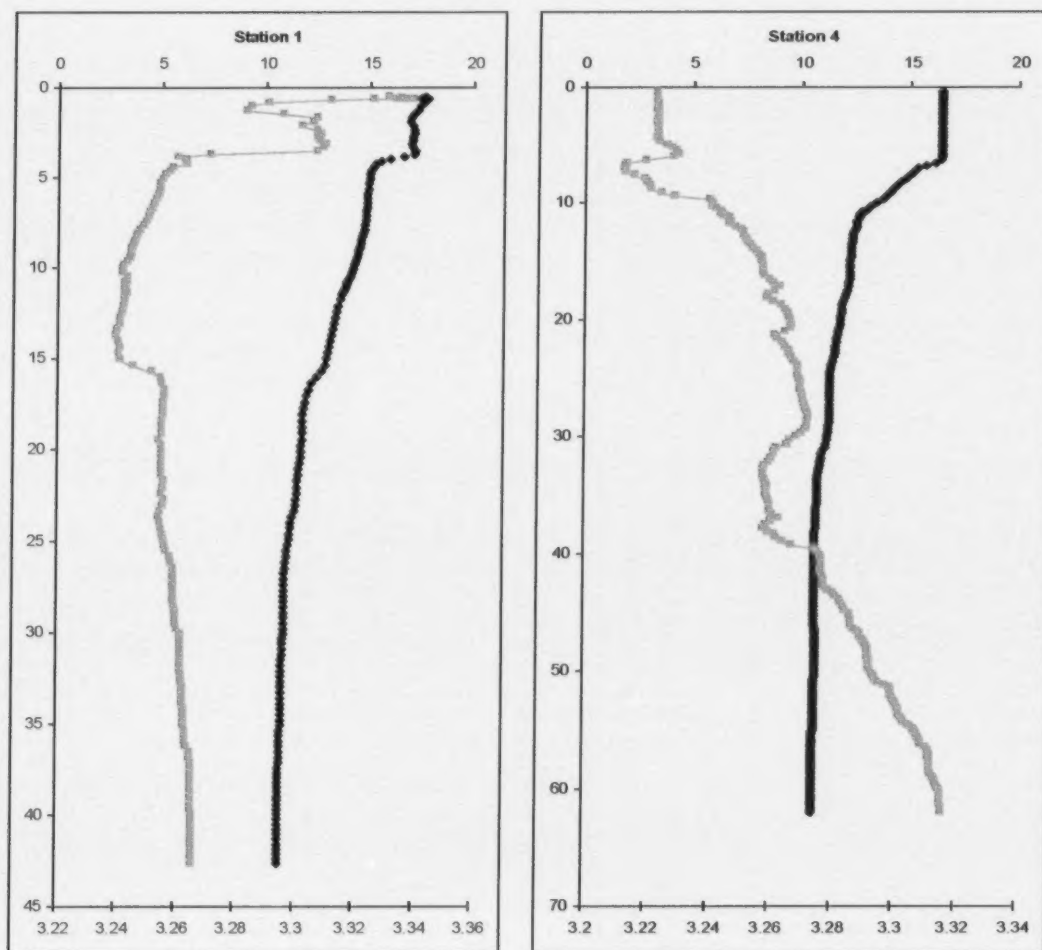


Figure 9...continued

French Creek (Transect 5)

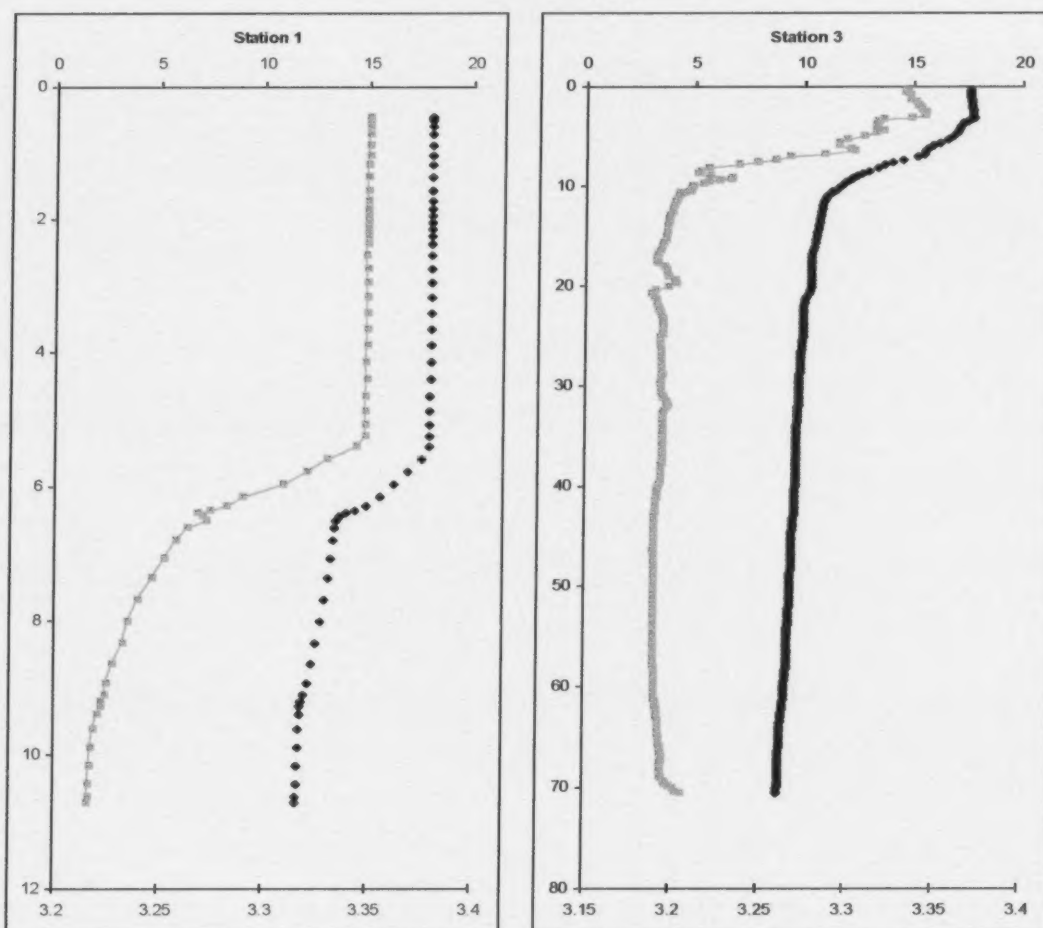


Figure 9...continued

Trincomali Channel (Transect 6)

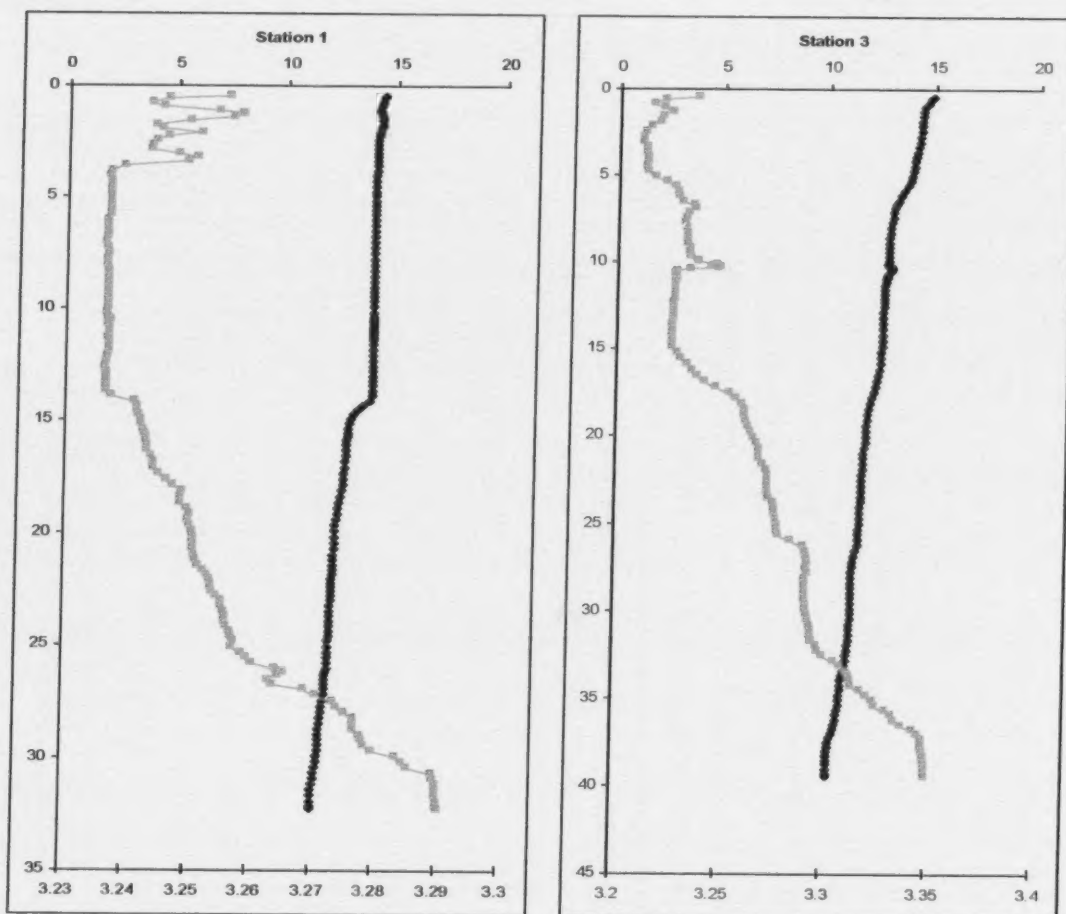


Figure 9... continued

Cape Cockburn (Transect 10)

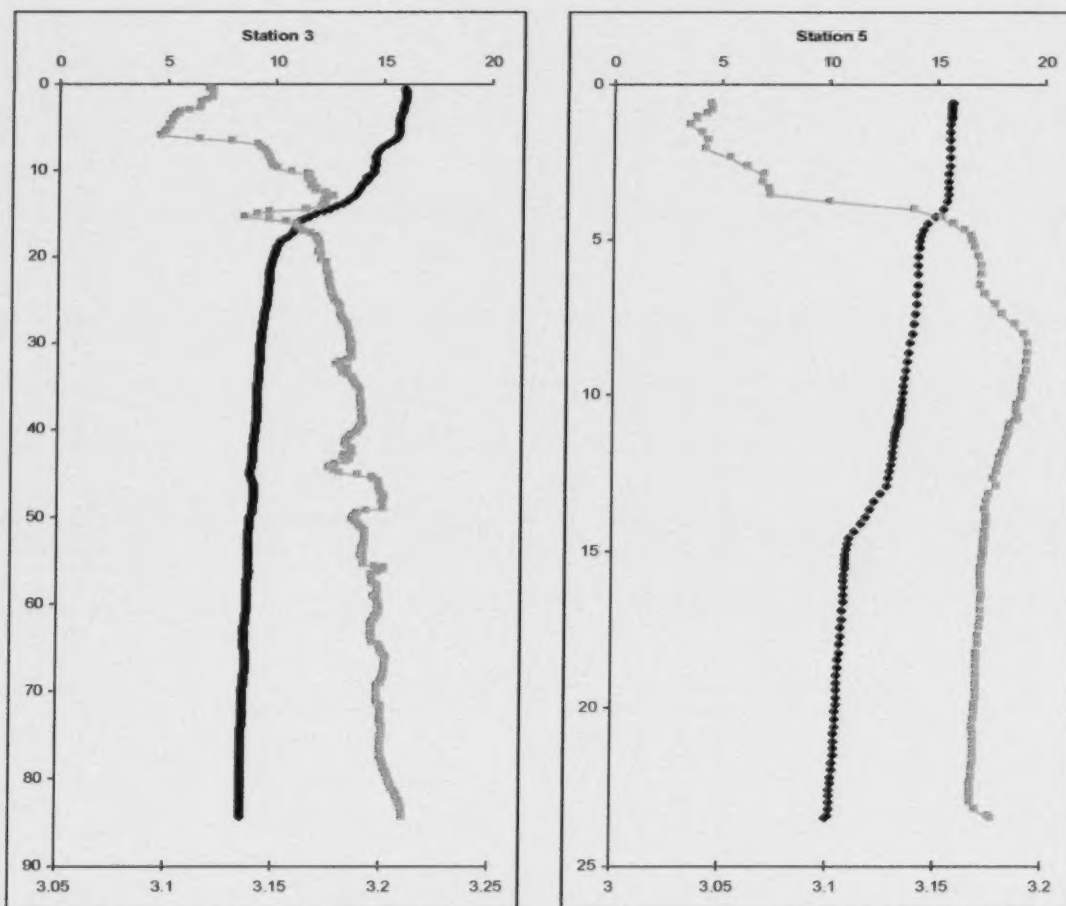


Figure 9...continued

Secret Cove (Transect 11)

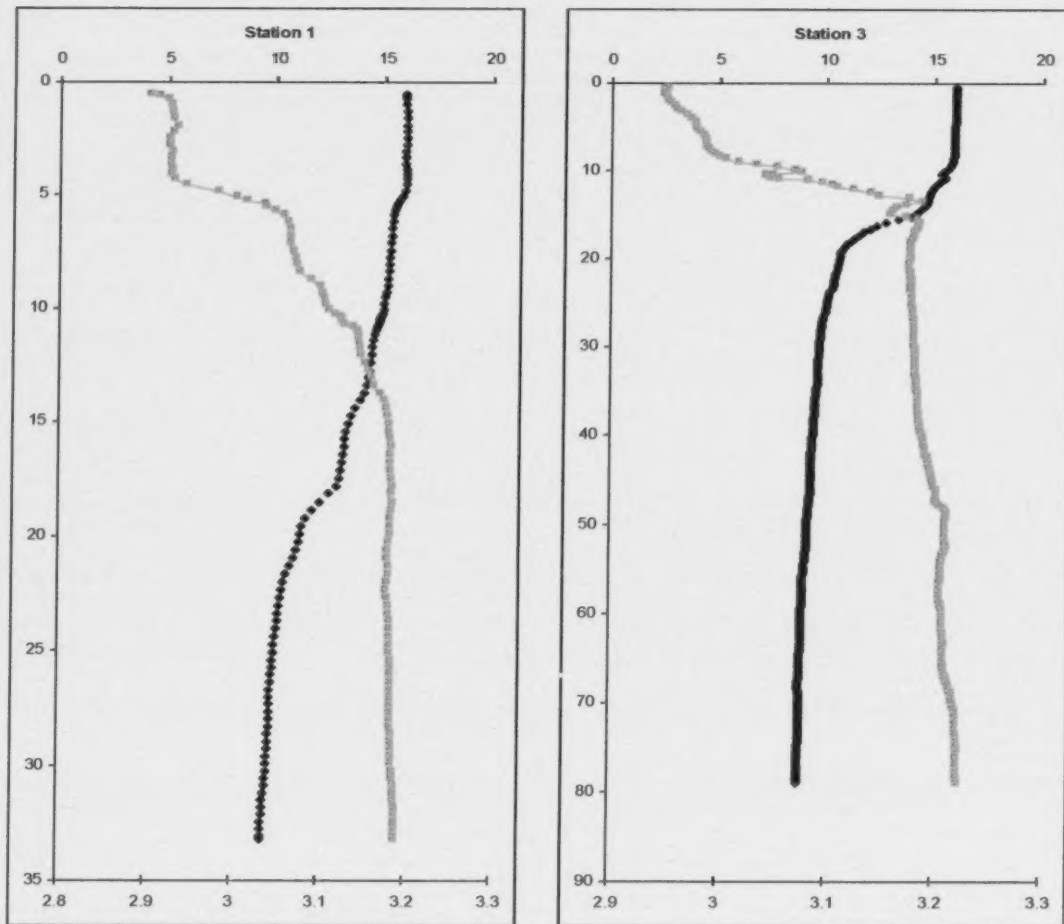


Figure 9...continued

Table 1. Summary of the purse seine set locations from the 2011 Strait of Georgia juvenile herring survey.

Year	Month	Day	Transect	Station	Seine Set Time	Location Name	DD Lat (N)	DD Long (W)
2011	9	11	6	1	2100	Trincomali Channel	48.855	123.430
2011	9	11	6	2	2120	Trincomali Channel	48.862	123.423
2011	9	11	6	3	2140	Trincomali Channel	48.867	123.417
2011	9	11	6	4	2200	Trincomali Channel	48.873	123.407
2011	9	11	6	5	2220	Trincomali Channel	48.877	123.407
2011	9	12	2	5	2050	Yellow Point	49.066	123.698
2011	9	12	2	4	2110	Yellow Point	49.060	123.708
2011	9	12	2	3	2130	Yellow Point	49.056	123.722
2011	9	12	2	2	2150	Yellow Point	49.050	123.733
2011	9	12	2	1	2215	Yellow Point	49.042	123.747
2011	9	13	1	1	2040	Clarke Rock	49.224	123.943
2011	9	13	1	2	2100	Clarke Rock	49.233	123.932
2011	9	13	1	3	2120	Clarke Rock	49.237	123.922
2011	9	13	1	4	2140	Clarke Rock	49.237	123.912
2011	9	13	1	5	2200	Clarke Rock	49.238	123.902
2011	9	14	5	5	2030	French Creek	49.366	124.317
2011	9	14	5	4	2045	French Creek	49.362	124.323
2011	9	14	5	3	2110	French Creek	49.358	124.327
2011	9	14	5	2	2130	French Creek	49.353	124.338
2011	9	14	5	1	2155	French Creek	49.348	124.350
2011	9	18	11	1	2105	Secret Cove	49.535	123.977
2011	9	18	11	2	2125	Secret Cove	49.532	123.995
2011	9	18	11	3	2145	Secret Cove	49.528	124.014
2011	9	18	11	4	2210	Secret Cove	49.527	124.040
2011	9	18	11	5	2230	Secret Cove	49.523	124.060
2011	9	19	10	5	2045	Cape Cockburn	49.632	124.278
2011	9	19	10	4	2110	Cape Cockburn	49.642	124.255
2011	9	19	10	3	2130	Cape Cockburn	49.651	124.242
2011	9	19	10	2	2150	Cape Cockburn	49.662	124.218
2011	9	19	10	1	2215	Cape Cockburn	49.670	124.198
2011	9	20	8	3	1955	Smelt Bay	50.054	125.030
2011	9	20	8	2	2015	Smelt Bay	50.046	125.016
2011	9	20	8	1	2045	Smelt Bay	50.036	125.000
2011	9	28	9	1	2050	Atrevida Reef	49.916	124.659
2011	9	28	9	2	2110	Atrevida Reef	49.912	124.673
2011	9	28	9	3	2130	Atrevida Reef	49.909	124.684
2011	9	28	9	4	2150	Atrevida Reef	49.906	124.694
2011	9	28	9	5	2205	Atrevida Reef	49.902	124.707
2011	9	29	4	1	2015	Henry Bay	49.593	124.875
2011	9	29	4	2	2030	Henry Bay	49.601	124.866
2011	9	29	4	3	2050	Henry Bay	49.598	124.856
2011	9	29	4	4	2110	Henry Bay	49.598	124.846
2011	9	29	4	5	2130	Henry Bay	49.602	124.836

Table 1 continued...

Year	Month	Day	Transect	Station	Seine Set Time	Location Name	DD Lat (N)	DD Long (W)
2011	9	30	3	5	2010	Bowser	49.482	124.651
2011	9	30	3	4	2025	Bowser	49.476	124.657
2011	9	30	3	3	2045	Bowser	49.467	124.663
2011	9	30	3	2	2105	Bowser	49.459	124.672
2011	9	30	3	1	2120	Bowser	49.452	124.680

Table 2. Summary of the purse seine set locations from the 2012 Strait of Georgia juvenile herring survey.

Year	Month	Day	Transect	Station	Seine Set Time	Location Name	DD Lat (N)	DD Long (W)
2012	9	11	6	1	2055	Trincomali Channel	48.855	123.430
2012	9	11	6	2	2120	Trincomali Channel	48.862	123.423
2012	9	11	6	3	2140	Trincomali Channel	48.867	123.417
2012	9	11	6	4	2200	Trincomali Channel	48.873	123.407
2012	9	11	6	5	2240	Trincomali Channel	48.877	123.407
2012	9	12	2	5	2105	Yellow Point	49.066	123.698
2012	9	12	2	4	2125	Yellow Point	49.060	123.708
2012	9	12	2	3	2150	Yellow Point	49.056	123.722
2012	9	12	2	2	2210	Yellow Point	49.050	123.733
2012	9	12	2	1	2230	Yellow Point	49.042	123.747
2012	9	13	1	1	2045	Clarke Rock	49.224	123.943
2012	9	13	1	2	2110	Clarke Rock	49.233	123.932
2012	9	13	1	3	2135	Clarke Rock	49.237	123.922
2012	9	13	1	4	2155	Clarke Rock	49.237	123.912
2012	9	13	1	5	2220	Clarke Rock	49.238	123.902
2012	9	17	11	1	2045	Secret Cove	49.535	123.977
2012	9	17	11	2	2105	Secret Cove	49.532	123.995
2012	9	17	11	3	2130	Secret Cove	49.528	124.014
2012	9	17	11	4	2155	Secret Cove	49.527	124.040
2012	9	17	11	5	2220	Secret Cove	49.523	124.060
2012	9	18	10	5	2045	Cape Cockburn	49.632	124.278
2012	9	18	10	4	2110	Cape Cockburn	49.642	124.255
2012	9	18	10	3	2140	Cape Cockburn	49.651	124.242
2012	9	18	10	2	2210	Cape Cockburn	49.662	124.218
2012	9	18	10	1	2240	Cape Cockburn	49.670	124.198
2012	9	19	8	3	2015	Smelt Bay	50.054	125.030
2012	9	19	8	2	2035	Smelt Bay	50.046	125.016
2012	9	19	8	1	2100	Smelt Bay	50.036	125.000
2012	9	19	9	1	0055	Atrevida Reef	49.916	124.659
2012	9	19	9	2	0115	Atrevida Reef	49.912	124.673
2012	9	19	9	3	0135	Atrevida Reef	49.909	124.684
2012	9	19	9	4	0200	Atrevida Reef	49.906	124.694
2012	9	19	9	5	0220	Atrevida Reef	49.902	124.707
2012	9	20	4	1	2030	Henry Bay	49.593	124.875
2012	9	20	4	2	2050	Henry Bay	49.601	124.866
2012	9	20	4	3	2110	Henry Bay	49.598	124.856
2012	9	20	4	4	2135	Henry Bay	49.598	124.846
2012	9	20	4	5	2155	Henry Bay	49.602	124.836
2012	9	21	3	1	2035	Bowser	49.452	124.680
2012	9	21	3	2	2055	Bowser	49.459	124.672
2012	9	21	3	3	2115	Bowser	49.467	124.663
2012	9	21	3	4	2140	Bowser	49.476	124.657
2012	9	21	3	5	2205	Bowser	49.482	124.651

Table 2 continued...

Year	Month	Day	Transect	Station	Seine Set Time	Location Name	DD Lat (N)	DD Long (W)
2012	9	26	5	5	2030	French Creek	49.366	124.317
2012	9	26	5	4	2050	French Creek	49.362	124.323
2012	9	26	5	3	2110	French Creek	49.358	124.327
2012	9	26	5	2	2130	French Creek	49.353	124.338
2012	9	26	5	1	2150	French Creek	49.348	124.350

Table 3. Summary of the number and weight by species, transect, and station for 2011 Strait of Georgia juvenile herring survey.

Transect	Station	Location Name	Species	Number	Weight (Kg) [*]
1	1	Clarke Rock	Pacific herring age-0+	12	0.07
			Pacific herring age-1+	1	0.03
			Squid	54	0.60
			Chinook salmon	1	0.08
			Juvenile walleye pollock	1	trace
1	2	Clarke Rock	Pacific herring age-0+	47	0.27
			Pacific herring age-1+	1	0.03
			Squid	32	0.63
			Chinook salmon	3	0.35
			Coho salmon	1	0.04
			Bay pipefish	1	trace
1	3	Clarke Rock	Pacific herring age-0+	18	0.11
			Pacific herring age-1+	4	0.14
			Chinook salmon	7	0.37
1	4	Clarke Rock	Pacific herring age-0+	24	0.15
			Pacific herring age-1+	3	0.11
			Chinook salmon	6	0.36
			Squid	2	0.01
			Pacific sand lance	1	trace
1	5	Clarke Rock	Pacific herring age-0+	15	0.10
			Pacific herring age-1+	3	0.13
			Chinook salmon	6	0.40
			Juvenile hake	5	0.01
2	1	Yellow Point	Pacific herring age-0+	518	2.83
			Chum salmon	2	0.10
			Pink salmon	2	0.06
			Squid	2	0.05
2	2	Yellow Point	Pacific herring age-0+	921	5.15
			Chum salmon	6	0.33
			Pink salmon	3	0.11
2	3	Yellow Point	Pacific herring age-0+	1670	9.26
			Squid	5	0.09
2	4	Yellow Point	Pacific herring age-0+	2916	15.94

* Weights ≤ 9 g referred to as trace

Table 3 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)
2	5	Yellow Point	Pacific herring age-0+	3681	20.09
			Northern anchovy	27	0.35
			Pink salmon	9	0.13
			Sculpin	9	0.20
3	1	Bowser	Pacific herring age-0+	42	0.36
			Pacific herring age-1+	46	1.55
			Pacific herring age-2+	110	6.47
			Squid	16	0.23
			Pacific sand lance	6	0.01
			Chinook salmon	4	0.24
			Juvenile walleye pollock	4	0.03
			Chum salmon	2	0.21
			Shiner perch	2	0.03
3	2	Bowser	Pacific herring age-2+	1	0.10
			Plainfin midshipman	1	0.02
			Pink salmon	1	0.10
3	3	Bowser	<i>NO CATCH</i>		
3	4	Bowser	Pacific herring age-0+	2	0.02
			Chinook salmon	1	0.04
			Chum salmon	1	0.10
			Gunnel	1	0.01
			Three-spine stickleback	1	trace
3	5	Bowser	Pacific herring age-1+	10	0.24
			Chum salmon	3	0.33
			Pink salmon	1	0.06
			Adult walleye pollock	1	0.41
			Juvenile walleye pollock	1	trace
4	1	Henry Bay	Pacific herring age-0+	102	0.69
			Three-spine stickleback	134	0.10
			Juvenile walleye pollock	6	0.03
			Flatfish	2	0.06
			Capelin	2	trace
			Snake prickleback	2	trace

Table 3 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)*
4	2	Henry Bay	Pacific herring age-0+	6	0.04
			Three-spine stickleback	5	0.01
			Plainfin midshipman	4	trace
			Gunnel	1	trace
			Juvenile walleye pollock	1	trace
4	3	Henry Bay	Pacific herring age-0+	322	2.37
			Plainfin midshipman	14	0.01
			Three-spine stickleback	4	0.01
			Juvenile walleye pollock	2	0.01
			Bay pipefish	2	trace
4	4	Henry Bay	Pacific herring age-0+	23	0.16
			Plainfin midshipman	5	trace
			Three-spine stickleback	4	0.01
			Bay pipefish	1	trace
			Pacific sand lance	1	trace
4	5	Henry Bay	Plainfin midshipman	20	0.04
			Pacific sand lance	14	0.03
			Gunnel	6	0.03
			Sculpin	2	0.04
			Three-spine stickleback	2	trace
			Bay pipefish	2	trace
5	1	French Creek	Pacific herring age-0+	126	1.00
			Pacific herring age-1+	261	9.64
			Pacific herring age-2+	351	20.33
			Northern anchovy	9	0.18
			Juvenile walleye pollock	9	0.03
5	2	French Creek	Pacific herring age-0+	11	0.08
			Plainfin midshipman	6	0.12
			Chinook salmon	3	0.20
			Pink salmon	3	0.14
			Coho salmon	1	0.21
			Sculpin	1	0.03
5	3	French Creek	Pacific herring age-0+	7	0.06
			Pacific herring age-1+	1	0.03
			Coho salmon	4	0.84
			Chinook salmon	1	0.02

Table 3 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)*
5	4	French Creek	Pacific herring age-0+	1	0.01
			Pacific herring age-1+	3	0.09
			Spiny dogfish	50	7.00
			Pink salmon	3	0.12
			Coho salmon	2	0.47
			Northern anchovy	1	0.02
5	5	French Creek	Spiny dogfish	100	15.00
6	1	Trincomali Channel	Pacific herring age-0+	208	1.32
6	2	Trincomali Channel	Pacific herring age-0+	369	2.23
			Pacific herring age-1+	1	0.01
			Juvenile walleye pollock	1	0.01
			Northern anchovy	1	trace
6	3	Trincomali Channel	Pacific herring age-0+	2175	11.74
			Chinook salmon	5	0.13
			Chum salmon	5	0.21
6	4	Trincomali Channel	Pacific herring age-0+	1765	9.27
6	5	Trincomali Channel	Pacific herring age-0+	1410	9.15
			Chinook salmon	5	0.12
8	1	Smelt Bay	Pacific herring age-0+	97	0.63
			Pacific herring age-1+	1	0.03
			Chum salmon	10	0.63
			Chinook salmon	2	0.22
			Three-spine stickleback	2	trace
			Plainfin midshipman	1	0.04
			Pink salmon	1	0.02
8	2	Smelt Bay	Pacific herring age-0+	408	2.56
			Chinook salmon	6	0.37
			Juvenile walleye pollock	4	0.02
			Squid	4	0.07
			Chum salmon	2	0.11
8	3	Smelt Bay	Pacific herring age-0+	8	0.05
			Chinook salmon	3	0.07
			Three-spine stickleback	1	trace

Table 3 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)*
9	1	Atrevida Reef	Pacific herring age-0+	17	0.14
			Juvenile walleye pollock	4	0.02
			Chum salmon	2	0.15
			Three-spine stickleback	2	trace
			Chinook salmon	1	0.02
			Sculpin	1	0.01
9	2	Atrevida Reef	Pacific herring age-0+	7	0.05
			Pacific herring age-1+	2	0.09
			Pacific herring age-2+	1	0.06
			Juvenile walleye pollock	101	0.74
			Chum salmon	1	0.08
			Coho salmon	1	0.02
			Pink salmon	1	0.06
			Juvenile hake	1	trace
9	3	Atrevida Reef	Pacific herring age-0+	4	0.02
			Pacific herring age-1+	120	3.38
			Pacific herring age-2+	32	1.74
			Pink salmon	76	5.57
			Three-spine stickleback	20	0.01
			Juvenile walleye pollock	16	0.08
			Chum salmon	4	0.24
			Juvenile hake	4	0.01
9	4	Atrevida Reef	Pacific herring age-0+	8	0.06
			Pacific herring age-1+	16	0.45
			Pacific herring age-2+	5	0.24
			Chum salmon	11	0.96
			Chinook salmon	6	0.25
			Three-spine stickleback	3	trace
			Juvenile hake	2	0.01
			Juvenile walleye pollock	1	0.01
9	5	Atrevida Reef	Pacific herring age-0+	5	0.03
			Pacific herring age-1+	7	0.19
			Pacific herring age-2+	5	0.25
			Juvenile walleye pollock	17	0.11
			Chum salmon	3	0.21
			Juvenile hake	2	0.01
			Three-spine stickleback	2	trace
			Chinook salmon	1	0.03
			Plainfin midshipman	1	0.01
			Adult walleye pollock	1	0.12

Table 3 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)*
10	1	Cape Cockburn	Pacific herring age-0+	61	0.44
			Pacific herring age-1+	2	0.05
			Northern anchovy	7	0.03
			Juvenile walleye pollock	2	0.01
			Plainfin midshipman	1	0.07
			Bay pipefish	1	trace
10	2	Cape Cockburn	Pacific herring age-0+	190	1.46
			Pacific herring age-1+	100	2.21
			Pacific herring age-2+	8	0.46
			Coho salmon	14	0.21
			Chinook salmon	12	0.21
			Juvenile hake	8	0.02
			Northern anchovy	2	0.01
			Juvenile walleye pollock	2	0.01
10	3	Cape Cockburn	Pacific herring age-0+	322	2.74
			Pacific herring age-1+	20	0.55
			Pacific herring age-2+	2	0.11
			Chinook salmon	16	0.33
			Chum salmon	4	0.32
			Juvenile hake	2	0.00
10	4	Cape Cockburn	Pacific herring age-0+	382	3.16
			Pacific herring age-1+	2	0.06
			Chum salmon	8	0.74
			Chinook salmon	4	0.08
			Juvenile hake	4	0.01
10	5	Cape Cockburn	Pacific herring age-0+	90	0.70
			Pacific herring age-1+	5	0.18
			Pacific herring age-2+	14	0.79
			Chum salmon	5	0.58
			Chinook salmon	2	0.09
			Flatfish	1	0.02
11	1	Secret Cove	Pacific herring age-0+	540	3.19
			Pacific herring age-1+	3	0.05
			Three-spine stickleback	24	0.03
			Northern anchovy	12	0.01
			Coho salmon	12	0.08
			Pacific sand lance	3	0.01

Table 3 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)*
11	2	Secret Cove	Pacific herring age-0+	14	0.11
			Pacific herring age-1+	38	0.87
			Three-spine stickleback	29	0.03
			Juvenile hake	14	0.04
			Chinook salmon	6	0.07
			Coho salmon	3	0.03
			Juvenile walleye pollock	2	0.01
			Adult walleye pollock	1	0.10
11	3	Secret Cove	Pacific herring age-0+	26	0.22
			Pacific herring age-1+	14	0.32
			Juvenile walleye pollock	8	0.04
			Juvenile hake	5	0.01
			Three-spine stickleback	4	trace
			Chinook salmon	2	0.03
			Coho salmon	2	0.02
			Northern anchovy	1	0.02
			Plainfin midshipman	1	0.01
			Adult walleye pollock	1	0.13
11	4	Secret Cove	Pacific herring age-0+	26	0.22
			Pacific herring age-1+	18	0.38
			Pacific herring age-2+	2	0.09
			Chum salmon	5	0.33
			Coho salmon	5	0.06
			Pink salmon	2	0.11
			Juvenile walleye pollock	2	0.01
			Chinook salmon	1	0.12
11	5	Secret Cove	Pacific herring age-0+	153	1.29
			Pacific herring age-1+	8	0.19
			Pacific herring age-2+	1	0.06
			Juvenile hake	7	0.03
			Chum salmon	3	0.19
			Chinook salmon	1	0.02
			Coho salmon	1	0.01
			Three-spine stickleback	1	trace

Table 4. Summary of the number and weight by species, transect, and station for 2012 Strait of Georgia juvenile herring survey.

Transect	Station	Location Name	Species	Number	Weight (Kg)*
1	1	Clarke Rock	Pacific herring age-0+	20448	180.35
			Pacific herring age-1+	5391	216.94
			Pacific herring age-2+	124	7.20
			Flatfish	62	1.87
			Juvenile walleye pollock	7	0.02
1	2	Clarke Rock	Pacific herring age-0+	3887	32.22
			Pacific herring age-1+	13	0.52
			Chinook salmon	13	1.66
			Coho salmon	13	0.66
			Bay pipefish	13	0.01
1	3	Clarke Rock	Pacific herring age-0+	3355	26.50
1	4	Clarke Rock	Pacific herring age-0+	3146	26.63
			Chinook salmon	11	1.51
			Juvenile walleye pollock	11	0.02
1	5	Clarke Rock	Pacific herring age-0+	662	5.74
			Juvenile walleye pollock	18	0.03
			Coho salmon	8	0.56
2	1	Yellow Point	Pacific herring age-0+	5239	33.15
			Chinook salmon	13	0.29
			Squid	13	0.41
2	2	Yellow Point	Pacific herring age-0+	3445	21.04
2	3	Yellow Point	Pacific herring age-0+	7329	49.83
			Plainfin midshipman	21	2.99
2	4	Yellow Point	Pacific herring age-0+	3384	22.88
			Northern anchovy	9	0.12
2	5	Yellow Point	Pacific herring age-0+	432	2.91
			Pacific sand lance	10	0.02
			Northern anchovy	2	0.05
			Gunnel	2	0.02
			Juvenile walleye pollock	2	0.01
			Shiner perch	2	0.01

* Weights ≤ 9 g referred to as trace

Table 4 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)
3	1	Bowser	Pacific herring age-0+	281	2.26
			Plainfin midshipman	32	0.02
			Pacific sand lance	19	0.05
			Chinook salmon	9	0.42
			Sculpin	3	0.12
			Shiner perch	2	0.04
			Flatfish	1	0.03
			Snake pricklyback	1	0.01
			Poacher	1	trace
3	2	Bowser	Pacific herring age-0+	524	4.06
			Pacific herring age-1+	2	0.04
			Plainfin midshipman	16	0.05
			Chinook salmon	6	0.35
			Snake pricklyback	2	0.02
3	3	Bowser	Pacific herring age-0+	2250	18.62
			Pacific herring age-1+	234	6.00
			Plainfin midshipman	27	0.59
			Juvenile walleye pollock	18	0.06
3	4	Bowser	Pacific herring age-0+	3204	25.46
			Pacific herring age-1+	27	0.76
			Juvenile walleye pollock	1935	10.42
3	5	Bowser	Pacific herring age-0+	4122	30.94
			Pacific herring age-1+	9	0.24
			Juvenile walleye pollock	18	0.09
4	1	Henry Bay	Pacific herring age-0+	778	6.14
			Snake pricklyback	48	0.06
			Squid	22	0.09
			Plainfin midshipman	12	0.01
			Three-spine stickleback	4	trace
4	2	Henry Bay	Pacific herring age-0+	1480	13.27
			Snake pricklyback	8	0.01
			Gunnel	4	0.01

Table 4 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)
4	3	Henry Bay	Pacific herring age-0+	440	3.79
			Plainfin midshipman	38	0.04
			Snake prickleback	12	0.03
			Squid	6	0.01
			Three-spine stickleback	4	0.01
4	4	Henry Bay	Pacific herring age-0+	9177	76.78
			Pacific herring age-1+	21	0.39
			Gunnel	21	0.10
4	5	Henry Bay	Pacific herring age-0+	18495	154.61
5	1	French Creek	Pacific herring age-0+	281	1.96
			Flatfish	7	0.21
			Shiner perch	4	0.03
			Tube-snout	4	0.01
			Chinook salmon	2	0.11
			Crab	2	0.50
			Ratfish	2	1.50
			Pacific sand lance	2	0.01
			Plainfin midshipman	1	0.00
			Juvenile walleye pollock	1	0.01
5	2	French Creek	Pacific herring age-0+	1485	12.44
			Pacific herring age-1+	10	0.28
			Coho salmon	5	0.23
5	3	French Creek	Pacific herring age-0+	265	2.38
			Pacific herring age-1+	8	0.27
			Chinook salmon	2	0.14
			Chum salmon	1	0.09
5	4	French Creek	Pacific herring age-0+	207	1.91
			Pacific herring age-1+	4	0.09
5	5	French Creek	Pacific herring age-0+	308	2.93
			Pacific herring age-1+	2	0.04
			Chinook salmon	2	0.13
			Chum salmon	2	0.28
			Coho salmon	2	0.37

Table 4 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)
6	1	Trincomali Channel	Pacific herring age-0+	202	1.07
			Three-spine stickleback	2	trace
			Coho salmon	1	0.07
			Plainfin midshipman	1	0.07
			Pacific sand lance	1	0.00
			Shiner perch	1	0.01
6	2	Trincomali Channel	Pacific herring age-0+	472	2.60
6	3	Trincomali Channel	Pacific herring age-0+	462	2.61
			Chinook salmon	2	0.05
6	4	Trincomali Channel	Pacific herring age-0+	366	2.11
6	5	Trincomali Channel	Pacific herring age-0+	2085	10.39
8	1	Smelt Bay	Pacific herring age-0+	222	1.35
			Pacific sand lance	5	0.01
			Coho salmon	2	0.03
			Juvenile walleye pollock	2	0.01
			Chinook salmon	1	0.08
8	2	Smelt Bay	Pacific herring age-0+	213	1.39
			Juvenile walleye pollock	14	0.05
			Chinook salmon	3	0.44
			Pacific sand lance	3	0.01
			Coho salmon	1	0.04
8	3	Smelt Bay	Pacific herring age-0+	1245	7.56
			Chinook salmon	6	0.12
9	1	Atrevida Reef	Pacific herring age-0+	10815	80.73
			Pacific herring age-1+	21	0.77
			Northern anchovy	21	0.30
9	2	Atrevida Reef	Pacific herring age-0+	4680	37.61
			Pacific herring age-1+	312	9.18
			Pacific herring age-2+	13	0.73
			Three-spine stickleback	169	0.12

Table 4 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg) ^a
9	3	Atrevida Reef	Pacific herring age-0+	1820	15.05
			Pacific herring age-1+	155	4.72
			Three-spine stickleback	10	0.01
			Chum salmon	5	0.11
9	4	Atrevida Reef	Pacific herring age-0+	3699	32.56
			Pacific herring age-1+	126	4.00
			Pacific herring age-2+	9	0.45
			Juvenile walleye pollock	18	0.06
			Three-spine stickleback	9	0.01
9	5	Atrevida Reef	Pacific herring age-0+	1420	12.32
			Pacific herring age-1+	40	1.29
			Pacific herring age-2+	16	1.02
			Chum salmon	20	2.30
			Juvenile walleye pollock	12	0.43
			Chinook salmon	8	0.61
10	1	Cape Cockburn	Pacific herring age-0+	92	0.84
			Pacific herring age-1+	2	0.05
			Juvenile walleye pollock	51	0.24
			Chinook salmon	21	0.48
			Three-spine stickleback	8	0.02
			Coho salmon	3	0.08
10	2	Cape Cockburn	Pacific herring age-0+	9	0.08
			Juvenile hake	45	0.13
			Chinook salmon	5	0.14
			Coho salmon	4	0.18
			Bay pipefish	1	trace
10	3	Cape Cockburn	Juvenile hake	63	0.21
			Chinook salmon	1	0.02
			Squid	1	0.03
10	4	Cape Cockburn	Juvenile hake	138	0.35
			Coho salmon	2	0.09
			Chinook salmon	1	0.04
			Bay pipefish	1	trace

Table 4 continued...

Transect	Station	Location Name	Species	Number	Weight (Kg)[*]
10	5	Cape Cockburn	Pacific herring age-0+	23	0.20
			Pacific herring age-1+	1	0.04
			Chinook salmon	3	0.21
			Coho salmon	2	0.06
			Shiner perch	2	0.01
			Squid	1	0.02
11	1	Secret Cove	Pacific herring age-0+	107	0.93
			Pacific herring age-1+	15	0.29
			Capelin	56	0.06
			Juvenile walleye pollock	30	0.11
			Three-spine stickleback	10	0.02
			Coho salmon	7	0.12
			Northern anchovy	5	0.02
			Chinook salmon	1	0.01
11	2	Secret Cove	Pacific herring age-0+	132	1.15
			Pacific herring age-1+	32	1.11
			Pacific herring age-2+	4	0.22
			Juvenile walleye pollock	64	3.27
			Juvenile hake	44	0.42
			Chinook salmon	2	0.04
			Coho salmon	2	0.13
11	3	Secret Cove	Pacific herring age-0+	139	1.28
			Pacific herring age-1+	19	0.53
			Pacific herring age-2+	1	0.05
			Juvenile hake	42	0.42
			Juvenile walleye pollock	7	0.25
			Three-spine stickleback	4	0.01
			Coho salmon	2	0.16
11	4	Secret Cove	Pacific herring age-0+	40	0.38
			Coho salmon	1	0.02
11	5	Secret Cove	Pacific herring age-0+	40	0.37
			Pacific herring age-1+	1	0.02
			Pacific herring age-2+	1	0.05
			Juvenile hake	114	0.27
			Coho salmon	2	0.15
			Chinook salmon	1	0.07
			Squid	2	0.01

Table 5. Percent occurrence by species in purse seine sets for the Strait of Georgia juvenile herring survey in 2011 and 2012.

Common Name	Scientific Name	% occurrence	
		2011	2012
Pacific herring age-0+	<i>Clupea pallasii</i> in year of birth	89.6	95.8
Pacific herring age-1+	<i>Clupea pallasii</i> in first year	54.2	45.8
Pacific herring age-2+	<i>Clupea pallasii</i> in second or more years	25.0	14.6
Adult walleye pollock	<i>Theragra chalcogramma</i>	8.3	-
Bay pipefish	<i>Syngnathus griseolineatus</i>	10.4	6.3
Capelin		2.1	2.1
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	52.1	43.8
Chum salmon	<i>Oncorhynchus keta</i>	37.5	8.3
Coho salmon	<i>Oncorhynchus kisutch</i>	22.9	33.3
Crab	<i>Metacarcinus magister</i>	-	2.1
	<i>Parophyrus vetulus</i> , <i>Lepidopsetta bilineata</i> , <i>Platichthys stellatus</i> , <i>Citharichthys stigmaens</i>	4.2	6.3
Flatfish		6.3	6.3
Gunnel	<i>Apodichthys flavidus</i> , <i>Pholis laeta</i>	22.9	12.5
Juvenile hake	<i>Merluccius productus</i>	39.6	33.3
Juvenile walleye pollock	<i>Theragra chalcogramma</i>	2.1	-
NO CATCH			
Northern anchovy	<i>Engraulis mordax mordax</i>	16.7	8.3
Pacific sand lance	<i>Ammodytes hexapterus</i>	10.4	12.5
Pink salmon	<i>Oncorhynchus gorbuscha</i>	22.9	-
Plainfin midshipman	<i>Porichthys notatus</i>	20.8	16.7
Poacher	<i>Agonus acipenserinus</i> , <i>Agonopsis emmelane</i>	-	2.1
Ratfish	<i>Hydrolagus coliei</i>	-	2.1
Sculpin	<i>Leptocottus armatus</i>	8.3	2.1
Shiner perch	<i>Cymatogaster aggregata</i>	2.1	10.4
Snake pricklyback	<i>Lumpenus sagitta</i>	2.1	10.4
Spiny dogfish	<i>Squalus acanthias</i>	4.2	-
Squid	<i>Loligo opalescens</i> , <i>Gonatus fabricii</i>	14.6	12.5
Three-spine stickleback	<i>Gasterosteus aculeatus</i>	33.3	18.8
Tube-snout	<i>Aulorhynchus flavidus</i>	-	2.1

* Jellyfish occurrence is not included due to the large quantities usually encountered and the inability to correctly quantify.

Table 6. Summary of the number of fish sampled, range of length, mean length, range of weight, mean weight, and standard deviations for two herring age classes. Total catch in numbers (N) and weight (Wt) of all herring by transect for the 2011 Strait of Georgia juvenile herring survey.

Age-0+			Length (mm)			Weight (g)			N	Wt (kg)
Location Name	Transect	Number Sampled	Range	Mean	SD	Range	Mean	SD		
Clarke Rock	1	116	72-88	78	3.47	4.79-9.55	5.94	0.76	116	0.69
Yellow Point	2	500	66-91	74	3.70	4.09-10.04	5.49	0.78	9706	53.26
Bowser	3	23	83-97	89	3.60	7.19-10.81	8.55	0.97	44	0.38
Henry Bay	4	180	69-91	81	4.13	4.56-9.73	7.14	0.88	453	3.26
French Creek	5	33	77-91	84	3.73	5.93-10.60	7.93	1.01	145	1.15
Trincomali Channel	6	499	62-94	76	6.53	3.42-11.15	5.81	1.46	5927	33.70
Smelt Bay	8	205	68-96	77	4.25	4.54-10.89	6.33	0.97	513	3.23
Atrevida Reef	9	38	71-97	81	6.37	5.12-11.97	7.50	1.60	41	0.30
Cape Cockburn	10	446	70-96	83	4.76	5.33-11.47	8.00	1.27	1045	8.50
Secret Cove	11	266	66-94	81	6.62	4.08-10.91	7.49	1.57	759	5.03
All Locations		2306	62-97	78	6.15	3.42-11.97	6.60	1.56	18749	109.51

Table 6 continued...

Age-1+			Length (mm)			Weight (g)			N	Wt (kg)
Location Name	Transect	Number Sampled	Range	Mean	SD	Range	Mean	SD		
Clarke Rock	1	12	125-145	136	6.65	26.50-46.07	35.55	6.61	12	0.43
Yellow Point	2	-	-	-	-	-	-	-	-	-
Bowser	3	33	98-147	132	11.80	10.52-45.92	30.81	7.99	56	1.79
Henry Bay	4	-	-	-	-	-	-	-	-	-
French Creek	5	33	110-147	135	8.30	20.77-50.62	36.30	6.91	265	9.77
Trincomali Channel	6	1	105	105	-	13.96	13.96	-	1	0.01
Smelt Bay	8	1	133	133	-	32.23	32.23	-	1	0.03
Atrevida Reef	9	55	107-147	126	11.28	16.80-51.09	28.57	8.32	145	4.10
Cape Cockburn	10	68	101-147	122	9.44	14.52-43.19	24.07	6.20	129	3.05
Secret Cove	11	49	98-144	120	11.07	12.48-39.23	22.46	6.59	81	1.81
All Locations		282	98-147	125	11.90	10.52-51.09	27.20	8.54	690	21.00

Age-2+			Length (mm)			Weight (g)			N	Wt (kg)
Location Name	Transect	Number Sampled	Range	Mean	SD	Range	Mean	SD		
Clarke Rock	1	-	-	-	-	-	-	-	-	-
Yellow Point	2	-	-	-	-	-	-	-	-	-
Bowser	3	56	149-186	163	8.83	39.29-95.17	59.50	10.91	111	6.57
Henry Bay	4	-	-	-	-	-	-	-	-	-
French Creek	5	39	148-174	157	6.81	45.02-78.00	57.91	8.62	351	20.33
Trincomali Channel	6	-	-	-	-	-	-	-	-	-
Smelt Bay	8	-	-	-	-	-	-	-	-	-
Atrevida Reef	9	19	148-169	156	5.82	41.97-60.35	52.18	5.21	43	2.30
Cape Cockburn	10	19	149-180	161	8.07	43.14-79.47	56.64	8.42	24	1.36
Secret Cove	11	3	148-163	153	8.66	45.37-57.98	50.33	6.72	3	0.15
All Locations		136	148-186	160	8.26	39.29-95.17	57.42	9.49	532	30.70

Table 7. Summary of the number of fish sampled, range of length, mean length, range of weight, mean weight, and standard deviations for three herring age classes. Total catch in numbers (N) and weight (Wt) of all herring by transect for the 2012 Strait of Georgia juvenile herring survey.

Age-0+		Number Sampled	Length (mm)			Weight (g)			N	Wt (Kg)
Location Name	Transect		Range	Mean	SD	Range	Mean	SD		
Clarke Rock	1	500	68-98	85	5.88	4.92-13.46	8.45	1.74	31498	271.51
Yellow Point	2	500	57-97	77	5.89	2.64-11.36	6.44	1.29	19829	129.80
Bowser	3	501	71-103	84	4.15	4.96-14.34	7.89	1.13	10381	81.34
Henry Bay	4	500	75-105	84	4.75	5.81-15.89	8.32	1.30	30370	254.59
French Creek	5	500	73-98	86	5.02	5.65-12.87	8.60	1.35	2546	21.62
Trincomali	6	501	58-104	74	4.51	2.74-13.84	5.34	0.96	3587	18.78
Smelt Bay	8	300	70-92	78	3.17	4.63-10.04	6.18	0.69	1680	10.29
Atrevida Reef	9	500	76-100	84	3.79	5.80-13.89	8.24	1.14	22434	178.25
Cape Cockburn	10	124	77-97	87	4.08	6.22-12.59	8.94	1.20	124	1.11
Secret Cove	11	353	71-106	88	4.22	5.29-16.02	8.98	1.30	458	4.10
All locations		4279	57-106	82	6.41	2.64-16.02	7.66	1.73	122907	971.39

Table 7 continued...

Age-1+			Length (mm)			Weight (g)			N	Wt (Kg)
Location Name	Transect	Number Sampled	Range	Mean	SD	Range	Mean	SD		
Clarke Rock	1	88	117-151	139	6.61	21.06-52.66	40.24	6.42	5404	217.46
Yellow Point	2	-	-	-	-	-	-	-	-	-
Bowser	3	31	111-136	123	7.43	19.49-36.17	25.73	4.61	272	7.04
Henry Bay	4	1	113	113	-	18.53	18.53	-	21	0.39
French Creek	5	15	110-153	129	11.47	17.61-53.41	29.31	9.08	24	0.68
Trincomali	6	-	-	-	-	-	-	-	-	-
Smelt Bay	8	-	-	-	-	-	-	-	-	-
Atrevida Reef	9	80	110-153	129	9.87	19.06-46.79	30.68	6.27	654	20.00
Cape Cockburn	10	3	112-141	125	14.73	18.26-38.74	28.10	10.26	3	0.08
Secret Cove	11	51	110-153	126	12.72	16.73-48.22	27.40	8.75	67	1.95
All locations		269	110-153	131	11.01	16.73-53.41	32.46	8.90	6445	247.57

Age-2+			Length (mm)			Weight (mm)			N	Wt (Kg)
Location Name	Transect	Number Sampled	Range	Mean	SD	Range	Mean	SD		
Clarke Rock	1	2	158-159	159	0.71	54.76-61.42	58.09	4.71	124	7.20
Yellow Point	2	-	-	-	-	-	-	-	-	-
Bowser	3	-	-	-	-	-	-	-	-	-
Henry Bay	4	-	-	-	-	-	-	-	-	-
French Creek	5	-	-	-	-	-	-	-	-	-
Trincomali	6	-	-	-	-	-	-	-	-	-
Smelt Bay	8	-	-	-	-	-	-	-	-	-
Atrevida Reef	9	6	156-174	167	6.63	50.27-75.94	60.19	10.66	38	2.20
Cape Cockburn	10	-	-	-	-	-	-	-	-	-
Secret Cove	11	4	154-160	157	3.46	47.16-56.80	52.37	4.31	6	0.32
All locations		12	154-174	162	6.94	47.16-75.94	57.23	8.50	168	9.72

Table 8. Grouping of organisms, by phylum with abbreviations from the 2011 plankton tows from the Strait of Georgia juvenile herring survey.

Coelenterata	
COEL	Medusae - <i>Aequorea victoria</i>
SIPH	Siphonophores
Ctenophora	
CTEN	Ctenophores
Annelida	
POLY	Polychaetes
Mollusca	
GAST	Prosobranch gastropods
PELE	Pelecypods
Arthropoda	
AMPH	Amphipods
BARN	Barnacle, unknown stage
CLAD	Cladocerans; <i>Podon sp.</i> and <i>Evadne sp.</i>
CNAU	Unidentified copepod nauplii
COPE	Copepods (see Table 9 for list of species)
CRAM	Crab megalopea, including porcellinadea
CRAZ	Crab zoea, including porcellinadea
EUPA	Adult euphausiids; mainly <i>Euphausia pacifica</i>
EUPL	Larval euphausiids; mainly <i>Euphausia pacifica</i>
OSTR	Ostracods
SHRI	Shrimp zoea
TLON	<i>Thysanoessa longipes</i>
TSPI	<i>Thysanoessa spinifera</i>
Ectoprocta	
ECTO	Ectoprocts; mainly <i>Membranipora sp.</i> larvae
Chaetognatha	
CHAE	Chaetognaths; mainly <i>Sagitta sp.</i>
Chordata	
FISHL	Fish larvae
LARV	Larvaceans; mainly <i>Oikopleura sp.</i> and some <i>Fritillaria sp.</i>
Miscellaneous	
EGGS	Unidentified eggs; either euphausiid or teleost

Table 9. Abbreviations for calanoid, cyclopoid, harpacticoid copepods identified in 2011 plankton samples from the Strait of Georgia juvenile herring survey.

Calanoid copepods

AETI	<i>Aetidius sp.</i>
ALON	<i>Acartia longiremis</i>
CALA	<i>Calanus sp.</i>
CMAR	<i>Calanus marshallae</i>
CPAC	<i>Calanus pacificus</i>
EBUN	<i>Eucalanus bungii</i>
EELO	<i>Eucalanus elongatus</i>
MPAC	<i>Metridia pacifica</i>
PARA	<i>Paracalanus sp.</i>
PPAR	<i>Paracalanus parvus</i>
PSEU	<i>Pseudocalanus sp.</i>
SMIN	<i>Scolecithricella minor</i>
TDIS	<i>Tortanus discaudatus</i>
UCAL	Unidentified or mixed juvenile calanoids

Cyclopoid copepods

CANG	<i>Corycaeus anglicus</i>
OATL	<i>Oithona atlantica</i>
OSIM	<i>Oithona similis</i>

Harpacticoid copepods

UHAR	Unidentified Harpacticoid
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Table 10. Number of zooplankton per m³ of water by set in samples from the 2011 Strait of Georgia juvenile herring survey. Species codes as shown in table 8 and 9.

Location	Tran	Stn	Volume (m ³)	AETI	ALON	AMPH	BARN	CALA	CANG	CHAE	CLAD	CMAR
Clarke Rock	1	1	15.752	2.5	0.5	1.9	2.2	-	34.0	-	-	-
		3	14.476	-	1.1	4.8	0.1	4.4	20.4	0.1	-	-
Yellow Point	2	1	13.905	-	-	4.6	2.3	20.7	33.4	-	2.3	-
		4	13.786	-	-	0.3	2.3	22.3	37.1	-	-	-
Bowser	3	1	13.789	-	-	8.2	8.7	-	8.7	0.1	-	-
		4	14.995	-	-	57.6	2.1	3.3	25.6	-	-	-
Henry Bay	4	1	11.949	-	-	1.3	0.3	-	12.7	-	-	-
		3	14.988	-	-	3.9	1.1	0.7	29.4	-	-	-
French Creek	5	1	9.270	-	-	2.6	0.4	-	10.8	-	-	-
		3	4.550	-	-	20.2	-	60.4	-	-	-	-
Trincomali Channel	6	1	6.352	-	-	-	81.6	-	22.7	-	12.6	-
		3	13.032	-	-	0.2	34.4	-	31.9	-	1.2	-
Smelt Bay	8	1	12.971	-	-	5.3	-	3.9	19.7	-	1.2	-
		2	13.598	-	-	0.1	-	11.5	18.8	-	-	-
Atrevida Reef	9	1	8.856	-	0.9	15.6	0.9	0.7	8.1	-	-	-
		3	13.925	-	-	36.8	-	59.1	-	2.3	-	-
Cape Cockburn	10	3	17.980	-	-	0.4	5.3	4.8	106.8	0.7	-	0.1
		5	12.011	-	-	0.2	-	51.3	66.6	0.3	-	0.1
Secret Cove	11	1	11.792	-	-	-	9.5	8.1	95.0	-	16.3	-
		3	11.372	-	-	2.8	8.4	9.2	78.8	0.4	22.5	0.7

Table 7 continued...

Location	Tran	Stn	CNAU	COEL	CPAC	CRAM	CRAZ	CTEN	EBUN	ECTO	EELO	EGGS	EUPA
Clarke Rock	1	1	-	0.3	0.3	0.4	3.3	15.7	-	0.5	-	1.0	-
		3	-	-	7.6	-	1.1	5.7	-	-	0.6	-	0.1
Yellow Point	2	1	4.6	34.5	1.2	0.6	4.6	51.2	-	-	-	-	-
		4	-	9.0	47.3	0.3	4.9	32.8	-	-	-	-	-
Bowser	3	1	-	5.4	-	-	-	5.4	-	-	-	0.6	-
		4	-	6.4	27.7	-	2.1	-	-	-	-	-	0.1
Henry Bay	4	1	-	0.5	-	-	2.4	8.6	-	-	-	-	-
		3	-	0.9	-	-	2.1	14.3	-	-	-	-	-
French Creek	5	1	-	0.9	-	-	-	62.1	-	-	-	-	-
		3	-	2.6	30.8	-	-	82.6	0.9	-	-	-	-
Trincomali Channel	6	1	-	2.0	-	0.2	0.9	4.7	-	-	-	-	-
		3	-	2.7	-	0.2	9.5	2.0	-	-	-	-	-
Smelt Bay	8	1	-	4.8	-	0.1	0.2	14.3	-	-	-	-	-
		2	-	6.8	-	0.3	11.0	21.3	-	-	-	0.1	-
Atrevida Reef	9	1	-	13.1	-	-	0.3	5.5	-	-	-	-	-
		3	-	3.4	-	-	-	2.3	-	-	32.4	-	103.6
Cape Cockburn	10	3	-	0.7	1.6	-	0.2	1.1	1.4	-	0.3	-	-
		5	-	0.8	0.7	0.2	1.2	3.0	0.5	-	-	-	-
Secret Cove	11	1	-	5.8	-	-	6.1	75.6	-	-	-	-	-
		3	-	2.8	3.2	-	0.4	40.8	1.1	-	0.2	-	4.2

Table 7 continued...

Location	Tran	Stn	EUPL	FISHL	GAST	LARV	MPAC	OATL	OSIM	OSTR	PARA	PELE	POLY
Clarke Rock	1	1	-	-	1.0	1.5	1.8	3.0	-	0.1	-	-	-
		3	-	-	-	1.1	10.2	1.1	-	1.8	-	-	-
Yellow Point	2	1	1.2	-	4.6	15.0	-	-	2.3	-	-	-	3.5
		4	-	-	-	27.9	-	-	-	-	-	-	0.3
Bowser	3	1	-	0.1	-	26.1	0.8	-	11.0	-	-	1.7	-
		4	-	-	2.1	32.0	496.2	-	19.2	2.1	-	-	2.1
Henry Bay	4	1	-	-	4.0	6.7	-	-	1.7	0.8	-	-	0.7
		3	-	-	6.9	13.9	0.1	-	4.8	-	-	-	-
French Creek	5	1	-	-	3.9	1.3	-	-	-	-	-	-	-
		3	-	0.9	-	-	17.6	-	-	3.5	1.1	-	-
Trincomali Channel	6	1	-	-	-	27.7	-	-	-	-	-	17.6	0.2
		3	-	-	-	16.0	-	-	1.2	-	-	-	2.5
Smelt Bay	8	1	1.2	-	9.9	24.7	-	-	-	-	-	4.9	2.5
		2	-	0.1	4.7	9.4	-	-	1.2	-	-	-	-
Atrevida Reef	9	1	-	-	14.5	12.6	0.6	-	7.2	-	-	-	0.1
		3	-	-	9.2	9.2	776.7	-	4.6	-	-	-	4.6
Cape Cockburn	10	3	0.2	-	10.7	-	1.0	-	12.5	6.0	-	-	12.9
		5	-	-	8.0	16.0	2.9	-	18.6	-	-	-	-
Secret Cove	11	1	1.4	-	4.1	35.3	-	-	5.4	-	73.3	-	-
		3	-	-	-	87.2	82.0	-	2.8	-	-	-	1.1

Table 7 continued...

Location	Tran	Stn	PPAR	PSEU	SHRI	SIPH	SMIN	TDIS	TLOH	TSPI	UCAL	UHAR
Clarke Rock	1	1	8.4	3.1	-	-	0.5	-	-	-	-	-
		3	6.6	8.8	-	0.6	1.1	-	-	-	-	-
Yellow Point	2	1	34.5	3.5	2.3	153.6	-	-	-	-	-	-
		4	67.3	-	0.9	33.1	-	-	-	-	-	-
Bowser	3	1	40.8	17.6	-	0.1	-	-	-	-	-	0.6
		4	66.2	98.0	2.1	-	-	-	-	-	10.7	-
Henry Bay	4	1	12.7	2.3	1.1	2.9	-	2.0	-	-	0.7	-
		3	20.1	9.1	-	8.8	-	-	-	-	-	-
French Creek	5	1	36.2	-	-	-	-	-	-	-	-	-
		3	390.3	35.2	-	0.9	-	-	-	-	-	-
Trincomali Channel	6	1	20.2	-	0.5	-	-	-	-	-	-	-
		3	35.6	9.8	0.6	0.2	-	-	-	-	3.7	-
Smelt Bay	8	1	144.6	4.5	0.1	-	-	-	-	-	-	-
		2	101.9	14.3	2.1	-	-	-	-	-	-	-
Atrevida Reef	9	1	143.2	28.7	-	-	-	-	-	0.1	-	-
		3	404.9	59.7	-	-	-	-	-	2.1	-	-
Cape Cockburn	10	3	174.9	48.5	0.1	-	-	-	0.1	7.2	-	-
		5	220.6	44.5	0.2	-	-	-	-	0.1	-	-
Secret Cove	11	1	16.3	10.9	-	-	-	-	-	-	-	-
		3	257.2	16.9	0.4	-	-	-	-	-	-	-

Table 11. Grouping of organisms, by phylum with abbreviations from the 2012 plankton tows from the Strait of Georgia juvenile herring survey.

Coelenterata	
COEL	Medusae - <i>Aequorea victoria</i>
SIPH	Siphonophores
Ctenophora	
CTEN	Ctenophores
Annelida	
POLY	Polychaetes
Mollusca	
GAST	Prosobranch gastropods
PELE	Pelecypods
Arthropoda	
AMPH	Amphipods
BARN	Barnacle, unknown stage
CLAD	Cladocerans; <i>Podon</i> sp. and <i>Evadne</i> sp.
COPE	Copepods (see Table 12 for list of species)
CRAM	Crab megalopea, including porcellinadea
CRAZ	Crab zoea, including porcellinadea
CUMA	<i>Cumacea</i> sp.
EUPA	Adult euphausiids; mainly <i>Euphausia pacifica</i>
EUPH	<i>Euphausia pacifica</i> ; any size
EUPL	Larval euphausiids; mainly <i>Euphausia pacifica</i>
MYSI	Mysids
OSTR	Ostracods
SHRI	Shrimp zoea
TSPI	<i>Thysanoessa spinifera</i>
Ectoprocta	
ECTO	Ectoprocts; mainly <i>Membranipora</i> sp. larvae
Chaetognatha	
CHAE	Chaetognaths; mainly <i>Sagitta</i> sp.
Chordata	
FISHL	Fish larvae
LARV	Larvaceans; mainly <i>Oikopleura</i> sp. and some <i>Fritillaria</i> sp.
Miscellaneous	
EGGS	Unidentified eggs; either euphausiid or teleost

Table 12. Abbreviations for calanoid, cyclopoid, harpacticoid copepods identified in 2012 plankton samples from the Strait of Georgia juvenile herring survey.

Calanoid copepods

AETI	<i>Aetidius sp.</i>
ALON	<i>Acartia longiremis</i>
CALA	<i>Calanus sp.</i>
CMAR	<i>Calanus marshallae</i>
CPAC	<i>Calanus pacificus</i>
EBUN	<i>Eucalanus bungii</i>
ELON	<i>Epilabidocera longipedata</i>
METR	<i>Metridia sp.</i>
MPAC	<i>Metridia pacifica</i>
OBOR	<i>Oncaea borealis</i>
PPAR	<i>Paracalanus parvus</i>
PSEU	<i>Pseudocalanus sp.</i>
SMIN	<i>Scolecithricella minor</i>
TDIS	<i>Tortanus discaudatus</i>
UCAL	Unidentified or mixed juvenile calanoids

Cyclopoid copepods

CANG	<i>Corycaeus anglicus</i>
OATL	<i>Oithona atlantica</i>
OSIM	<i>Oithona similis</i>

Harpacticoid copepods

UHAR	Unidentified Harpacticoid
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Table 13. Number of zooplankton per m³ of water by set in samples from the 2012 Strait of Georgia juvenile herring survey. Species codes as shown in table 11 and 12.

Location	Tran	Stn	Volume (m ³)	AETI	ALON	AMPH	BARN	CALA	CANG	CHAE	CLAD	CMAR
Clarke Rock	1	1	2.821	-	-	-	34.7	-	45.4	-	-	-
		3	3.898	-	-	0.8	16.4	36.9	24.6	-	-	0.3
Yellow Point	2	1	11.339	-	-	-	1.4	-	36.7	-	22.6	-
		4	11.429	2.8	-	0.7	8.4	35.7	81.2	-	2.8	-
Bowser	3	1	5.365	-	-	-	129.7	-	4.5	-	11.9	-
		3	10.837	-	-	1.2	10.3	7.0	5.9	-	-	0.1
Henry Bay	4	1	3.561	-	-	1.1	359.5	-	18.0	-	18.0	-
		3	6.918	-	-	0.3	513.4	-	23.1	-	4.6	-
French Creek	5	1	2.734	-	35.1	-	1.1	23.4	35.1	-	-	-
		3	4.955	-	6.5	3.8	26.0	20.8	29.1	-	-	-
Trincomali Channel	6	1	13.175	-	-	5.1	131.2	-	58.3	-	126.3	-
		3	12.759	-	2.5	-	163.0	3.1	55.2	-	30.1	-
Smelt Bay	8	1	8.975	-	8.9	-	23.3	-	17.8	-	25.0	-
		2	9.538	-	23.5	2.3	17.0	-	23.5	0.2	13.4	-
Atrevida Reef	9	1	10.808	-	1.5	1.7	1.7	-	1.5	-	-	-
		3	13.569	10.6	1.2	25.9	-	-	15.3	-	-	-
Cape Cockburn	10	3	17.762	-	0.9	9.0	-	10.8	-	0.5	-	-
		5	15.159	-	-	0.4	-	0.1	5.3	-	-	-
Secret Cove	11	1	2.731	-	-	0.7	20.1	2.9	35.1	-	-	-
		3	5.600	-	8.6	1.1	2.9	13.6	34.3	0.9	-	0.2

Table 13 continued...

Location	Tran	Stn	COEL	CPAC	CRAM	CRAZ	CTEN	CUMA	EBUN	ECTO	EGGS	ELON	EUPA
Clarke Rock	1	1	6.4		0.7	0.4	25.5			5.7			
		3	0.3	0.8			4.6		1.3		24.6		1.3
Yellow Point	2	1	10.1			3.0	8.8				1.4		0.1
		4	13.6	2.8	0.7	0.7	12.6						0.2
Bowser	3	1	0.4			1.1	0.2						
		3	2.0	0.3	0.1	0.2	3.7		0.2	4.5			0.2
Henry Bay	4	1	130.3		1.7	2.2	20.2			18.0			
		3	48.9		0.6	0.3	4.0			32.4			
French Creek	5	1	142.6				10.6						
		3		0.4			3.2		0.2	25.8			
Trincomali Channel	6	1	3.4		0.3	6.4	2.3	0.1		4.9	0.1		
		3	4.4			1.3	2.5			2.5			
Smelt Bay	8	1	0.9			0.1	0.6		0.3				
		2	24.5	4.0			0.6		0.6				2.3
Atrevida Reef	9	1	3.1		0.2	0.2	9.4			17.8	1.5		
		3	1.2						1.2		3.5		133.2
Cape Cockburn	10	3					5.0		66.7		28.8		2.3
		5	0.3				11.9		2.9	2.6	0.3		0.1
Secret Cove	11	1	5.9		0.4	0.4	18.3		1.1	111.3	23.4		
		3	0.4			0.2	6.3		1.4	17.1	37.1	0.2	0.2

Table 13 continued...

Location	Tran	Stn	EUPH	EUPL	FISHL	GAST	LARV	METR	MPAC	MYSI	OATL	OBOR	OSIM
Clarke Rock	1	1	-	-	-	-	2569.2	-	-	-	-	-	28.4
		3	-	-	-	-	2274.2	-	0.3	-	-	-	82.1
Yellow Point	2	1	-	-	-	-	94.5	-	-	-	-	-	1.4
		4	-	-	-	-	198.8	-	-	-	-	-	2.8
Bowser	3	1	-	1.5	-	7.5	498.0	-	-	-	-	-	-
		3	0.8	0.1	-	-	133.6	-	0.5	-	-	0.7	6.6
Henry Bay	4	1	-	-	0.6	18.0	1851.2	-	-	-	-	-	107.8
		3	-	-	-	-	763.2	-	0.3	-	-	-	-
French Creek	5	1	-	-	-	11.7	1439.5	-	-	-	-	-	117.0
		3	-	0.2	-	6.5	552.2	-	8.1	-	-	-	138.8
Trincomali Channel	6	1	-	-	-	19.4	213.7	-	-	-	-	-	4.9
		3	-	-	-	25.1	323.5	-	-	-	-	-	-
Smelt Bay	8	1	-	5.3	-	-	201.5	-	-	-	-	-	17.8
		2	-	3.4	0.2	-	463.0	-	-	-	-	-	3.4
Atrevida Reef	9	1	-	-	0.2	13.3	151.0	-	-	0.2	-	-	14.8
		3	-	-	-	-	79.0	-	49.5	-	9.4	-	-
Cape Cockburn	10	3	-	0.9	-	-	20.7	5.4	-	-	16.2	-	30.6
		5	-	-	-	-	3.7	0.2	-	-	-	-	3.4
Secret Cove	11	1	-	5.9	-	11.7	1060.3	-	-	-	-	-	123.0
		3	-	-	-	-	517.2	-	0.5	-	-	-	88.6

Table 13 continued...

Location	Tran	Stn	OSTR	PELE	POLY	PPAR	PSEU	SHRI	SIPH	SMIN	TSPI	UCAL	UHAR
Clarke Rock	1	1	-	-	17.0	130.4	-	0.4	0.4	-	-	34.0	-
		3	-	-	-	321.7	28.2	0.3	1.0	-	-	-	-
Yellow Point	2	1	-	-	-	5.6	1.4	1.2	87.7	-	-	0.2	-
		4	-	-	8.4	92.4	-	3.8	118.6	-	-	-	-
Bowser	3	1	-	-	-	17.9	-	2.4	12.9	-	-	-	-
		3	-	-	0.7	30.3	-	2.8	6.9	-	0.2	-	-
Henry Bay	4	1	-	-	55.0	197.7	-	4.5	200.0	-	-	55.0	-
		3	-	-	13.9	41.6	-	1.2	87.3	-	-	0.6	-
French Creek	5	1	-	11.7	70.2	105.3	-	13.2	50.1	-	-	-	-
		3	-	-	-	165.5	3.2	-	27.0	-	0.4	-	-
Trincomali Channel	6	1	0.6	-	9.8	53.4	19.4	10.6	2.7	-	-	19.4	-
		3	-	-	7.6	172.4	10.0	2.7	13.2	-	-	0.2	-
Smelt Bay	8	1	-	-	-	90.9	-	-	3.1	-	-	-	-
		2	-	-	0.2	140.9	-	2.3	261.9	-	-	13.6	3.4
Atrevida Reef	9	1	-	-	-	75.5	-	4.8	7.0	-	1.3	4.4	4.4
		3	-	-	-	41.3	1.2	-	-	-	-	10.6	-
Cape Cockburn	10	3	-	-	10.4	67.6	25.2	-	0.5	-	-	3.6	-
		5	-	-	-	12.9	13.9	-	0.1	0.8	-	-	-
Secret Cove	11	1	-	-	-	99.6	20.5	-	23.1	11.7	-	-	-
		3	-	-	1.8	138.6	11.4	0.2	26.8	-	-	-	-